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Patient Notification Events Due to Syringe Reuse and Mishandling of Injectable Medications by Health Care Personnel —United States, 2012–2018: Summary and Recommended Actions for Prevention and Response

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Abstract

Objectives: To summarize patient notifications resulting from unsafe injection practices by health care personnel in the United States and describe recommended actions for prevention and response.

Patients and Methods: We examined records of events involving communications to groups of patients, conducted from January 1, 2012, through December 31, 2018, in which bloodborne pathogen testing was recommended or offered because of potential exposure to unsafe injection practices by health care personnel in the United States. Information compiled included: health care setting(s), type of unsafe injection practice(s), number of patients notified, number of outbreak-associated infections, and whether evidence suggesting bloodborne pathogen transmission prompted the notification. We compared these numbers with a similar review conducted from January 1, 2001, through December 31, 2011.

Results: From 2012 through 2018, more than 66,748 patients were notified as part of 38 patient notification events. Twenty-one involved exposures in non-hospital settings. Twenty-five involved syringe and/or needle reuse in the context of routine patient care; 11 involved drug tampering by a health care provider. The majority of events (n=25) were prompted by identification of unsafe injection practices alone, absent any documented infections at the time of notification. Outbreak-associated hepatitis B virus and/or hepatitis C virus infections were documented for 11 of the events; 8 involved patient-to-patient transmission, and 3 involved provider-to-patient transmission.

Conclusions: Since 2001, nearly 200,000 patients in the United States were notified about potential exposure to blood-contaminated medications or injection equipment. Facility leadership has an obligation to ensure adherence to safe injection practices and to respond properly if unsafe injection practices are identified.

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The Centers for Disease Control and Prevention (CDC) has issued health care infection control practice guidelines and communications, emphasizing that adherence to safe injection practices is a core element of Standard Precautions.[1] Standard Precautions refers to a group of infection prevention practices intended to prevent pathogen transmission that apply to all patient care, regardless of a patient's suspected or confirmed infectious state. Targeted educational efforts for health care providers, begun in the mid-2000s, were spurred by large outbreaks of viral hepatitis transmission in US health care facilities that were associated with unsafe injection practices.[1,2] CDC and its partners launched a multimodal injection safety educational campaign[2] and highlighted gaps in patient protections, particularly in outpatient settings where most of the outbreak activity was identified.

Reuse of syringes and/or needles is the most egregious type of unsafe injection practice because it can carry a substantial risk of bloodborne pathogen transmission, as evidenced from numerous outbreak investigations.[3] This risk can present along 2 pathways: 1 direct and the other indirect, as follows. In the first, a syringe or needle is actually reused for more than 1 patient. Downstream patients may thus be exposed to blood from persons for whom the equipment was used previously. The indirect pathway does not require needles or syringes to be used for more than 1 patient. Instead, reuse contaminates a medication container, and risk is propagated from reuse of the container. In this scenario, a syringe or needle is reused to access a medication container (eg, in the process of redosing an individual patient), which can introduce blood into the medication container. If that container is not discarded and is used again for other patients, they can be exposed to blood from persons for whom the medication was used previously. As both of these forms of syringe reuse can expose patients to the blood of other patients (either directly through the used syringe/needle or indirectly through the medication container that becomes contaminated when accessed by a used needle or syringe), CDC considers these "never events." If these practices are identified, they warrant notification and testing of potentially exposed patients for bloodborne pathogens.[4]

Between 2001 and 2011, more than 130,000 patients, as part of 35 separate US events, were notified about possible exposure to blood-contaminated medications or injection equipment and advised to undergo bloodborne pathogen testing.[5] Many—but not all—of these patient notification events took place in the context of a recognized outbreak; some were prompted by the identification of reuse of syringes or needles as described here. Outbreaks and patient notification events associated with reuse of syringes or needles continue to be identified. As an update to our previous review,[5] we summarize the US experience since 2012 and highlight additional actions necessary to address the patient safety threat from these "never events."

PATIENTS AND METHODS

Using methods similar to those in our previous review, we summarized available information from injection safety-related patient notification events occurring in the United States from January 2012 through December 2018. An injection safety-related patient notification event was defined as a communication recommending or offering bloodborne pathogen testing to a group of patients because they were exposed to medications or injection equipment that

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could have been contaminated with blood caused by unsafe practices by a health care provider. Drug tampering refers to a type of drug theft (diversion), in which the drug, commonly a narcotic, is removed and replaced with a similar appearing liquid (eg, saline). This practice has been associated with bloodborne pathogen transmission when, through reuse of syringes and/or needles, patients were exposed to the blood of infected providers.[6] Depending on the methods used, this practice could also pose risk of patient-to-patient transmission and has been associated with bacterial transmission.[6] An outbreak-associated infection was defined as a patient infection that was epidemiologically linked to the implicated health care setting or unsafe injection practice. We excluded incidents that involved isolated errors affecting a single patient, outbreaks or patient notification events for which bloodborne pathogen testing was not recommended or offered,[7,8] and notifications prompted by infection control breaches unrelated to preparation or administration of injectable medications (eg, reuse of fingerstick devices, lapses in reprocessing of reusable medical equipment).[9] Although patient notification events due to unsafe injection practices are not nationally notifiable, CDC is frequently consulted to provide assistance with risk assessment, patient evaluation, outbreak investigation, and/or risk communication during such events.[10] CDC maintains records of injection safety-related consultations including investigation notes, e-mail correspondence, laboratory findings, and, when available, official reports and published articles. CDC staff also track injection safety-related patient notification events through news alerts (eg, Google Alerts using key terms: *hepatitis, HIV, injection*) and regular reviews of conference abstracts or proceedings and peer-reviewed journals (using PubMed search terms such as *notification* and *injection safety*).

For this summary, we compiled the following information for each notification event: year of notification, affected state(s), health care setting(s), type of unsafe injection practice(s) described by investigators, number of patients notified, number of outbreak-associated infections, and whether there was evidence suggesting bloodborne pathogen transmission (eg, new viral hepatitis infections in patients who had received care at the facility) prompting the patient notification. Number of patients notified refers to the number of patients targeted for notification based on potential exposure. If exact numbers were not available we used estimates provided in the listed references. Further, referencing our previous summary[5] of patient notification events from January 2001 through December 2011, we analyzed injection safety–related events, by year, to evaluate for trends over the past 18 years.

RESULTS

From January 1, 2012, through December 31, 2018, we identified 38 patient notification events in 24 states related to possible exposure to blood-contaminated medications or injection equipment (Figure 1 and Table).[6,11–46] More than 66,748 patients were notified; the mean number of patients notified per event was 1804 (range: 19 to >12,000). More than half of the events (n=21, 55%) involved exposures occurring in a non-hospital setting. The majority of events (n=25, 66%) were prompted by identification of unsafe injection practices alone, absent any documented bloodborne pathogen infections at the time the notification was initiated. Outbreak-associated hepatitis B virus (HBV) and/or hepatitis C virus (HCV) infections were documented for 11 of the events (29%). Of these, 8 involved patient-to-patient transmission; the remainder involved provider-to-patient transmission through drug

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tampering by an HCV-infected provider. No cases of outbreak-associated human immunodeficiency virus (HIV) were reported.

Twenty-five (66%) of the patient notification events involved syringe and/or needle reuse in the context of routine patient care; 14 (37%) involved direct reuse of syringes and/or needles, including insulin pens (n=6), for more than 1 patient, and 11 (29%) involved reuse of syringes and/or needles to access medication containers that may have then been used for additional patients. Eleven (29%) of the patient-notification events, including 3 of the 5 largest notifications, involved drug tampering by a health care provider. Seven of the events involving drug tampering were prompted by identification of the behavior rather than investigation of newly identified infections. Once the behavior was identified and reported, a retrospective assessment of risk to patients was performed (eg, bloodborne pathogen status of the implicated provider, method of tampering) and, based on findings, a patient notification was performed.

Differences in lapses were noted by setting. Non-hospital settings accounted for all of the events involving reuse of syringes and/or needles to access medication containers that may have been used for more than 1 patient. Hospitals accounted for most (n=9, 64%) of the events in which a syringe and/or needle was used for more than 1 patient, including all events involving insulin pens (n=6); the majority (n=9; 82%) of events involving drug tampering by a health care provider also occurred in hospitals. The majority of events (n=35, 92%) involved notification of patients exposed in a single setting. Four events,[6,19,20,33,37–40] including 3 associated with drug tampering, required notification of patients at more than 1 facility because of concerns that the implicated health care provider had performed the same unsafe practices elsewhere; 2[6,37–40] of these involved facilities in multiple states.

DISCUSSION

This analysis identified 38 patient notification events from 2012 to 2018 stemming from the identification of dangerous and substandard injection practices. Combining these results with the previously published summary of US experience dating back to 2001,[5] we have 73 separate events over an 18-year period; more than half (n=38) occurred in the most recent 7-year period (Figure 2). Since 2001, more than 196,946 patients have been notified about exposure to medications or injection equipment that could have been contaminated with blood because of unsafe practices by health care providers in the United States. The total number notified is staggering, considering the anxiety and uncertainty faced by patients while they awaited their test results, as well as other effects and costs borne by patients, health care providers, facilities, and health departments.[10]

Our review is subject to the following limitations. We only included injection-safety–related patient notification events to a group of patients when bloodborne pathogen testing was recommended or offered. Our review also does not capture outbreaks of bacterial infections or other adverse events resulting from exposure to other types of unsafe injection practices (eg, reuse of single-dose containers or failure to follow aseptic technique when preparing and administering injections). Despite this, the true number of patients potentially exposed to bloodborne pathogens through syringe reuse in US health care facilities is likely much

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higher than that reported in our review. For example, in a recent survey, 12.4% of physicians and 3% of nurses reported that reuse of syringes for more than 1 patient occurs in their workplace; nearly 5% of physicians reported this practice usually or always occurs.[47] If the syringe reuse reported by physicians and nurses in the survey are representative of what is occurring nationally, it is likely that many more patients, beyond those reported here, have been placed at unacceptable risk of infection. Further, it might not be not possible definitively to link infections identified as part of a patient notification to the facility practices or exposures that precipitated notification and testing. Therefore, the number of outbreak-associated viral hepatitis infections (and outbreaks) reported as part of these notification events is also likely to be an underestimate.

The majority (63%) of patient-notification events described from 2001 through 2011 were initiated following identification of new viral hepatitis infection in 1 or more patients without traditional risk factors. The subsequent investigation identified unsafe injection practices, prompting broader notification and testing. In contrast, two-thirds of events over the past 7 years were prompted by identification of the unsafe practice, absent initial evidence suggesting bloodborne pathogen transmission (Figure 2). This apparent shift may reflect increased awareness by both providers and public health entities of the risks posed by unsafe injection practices. It may also be reflective of movement toward greater transparency by health care facilities when breaches of the standard of care are identified. For example, 1 hospital sent letters to 341 patients who could have been affected by drug tampering by a hospital employee.[7] Bloodborne pathogen testing of the implicated health care provider as part of the initial investigation was negative. However, the hospital still wanted to make patients aware that this unsafe injection practice had occurred, adjust their billing records, and inform them of the actions being taken to prevent similar events in the future.

Despite some encouraging developments, current efforts are not entirely addressing the patient safety threat from unsafe injection practices. In addition to materials generated by CDC, there are multiple professional organizations that emphasize the tenets of safe injection practices in their specialty-specific guidelines.[48,49] However, ensuring this message reaches every provider who prepares and administers injections continues to be a challenge. Dangerous myths and misperceptions, including the belief that it is safe to reuse syringes as long as the needle is changed or the injection is administered through an intervening length of intravenous (IV) tubing, continue to persist. For example, the Texas nurse who reused prefilled syringes of saline flush in the intravenous lines of multiple patients reported believing this was a safe, cost-saving measure if no fluids were withdrawn into the syringe before injection of the saline flush (Table).[36] As documented in the report, this nurse’s actions resulted in HCV transmission, which was uncovered as a result of the ensuing patient notification and investigation.

Ultimately, it is the responsibility all providers, including facility leadership, to ensure adherence to safe injection practices as part of their institution’s commitment to patient safety and quality care. Facility leadership should ensure that every provider who cares for patients in their facility is appropriately trained; conduct routine auditing and provide feedback on adherence to safe injection practices; and have a system to prevent, detect, and respond to drug diversion. Every provider involved in injection preparation or administration

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should be aware of the infection prevention practices necessary to keep patients safe. These expectations are defined in Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC).[50] They include providing "job-specific infection prevention education and training to all health care personnel for all tasks" and "developing processes to ensure that all health care personnel understand and are competent to adhere to infection prevention requirements as they perform their roles and responsibilities." In addition, facilities should regularly "monitor adherence to infection prevention practices and infection control requirements" and provide "prompt, regular feedback on adherence and related outcomes to health care personnel and facility leadership." CDC has developed various injection safety resources, including checklists, that can be used to educate health care personnel and to monitor ongoing adherence to recommended practices.[2] CDC has also developed guidance specifically addressing safe use of insulin pens (eg, proper labeling and storage)[51] and materials addressing risks associated with drug diversion by health care personnel.[52] Facilities are encouraged to expand upon these tools to incorporate elements reflecting their own facility-specific policies and procedures. As a first step, we suggest a comprehensive inventory be performed to identify all the ways that injections or infusions are delivered so as to enable a thorough review of practices, training, and related training or resource needs.

Facilities should emphasize that health care personnel have an obligation to intervene if they observe a practice placing patients at risk. Observation and reporting by a coworker was how many of the unsafe injection practices were initially detected in the patient-notification events described here. For example, a coworker observed and reported a surgical technician in Colorado stealing a syringe filled with fentanyl in the operating room.[39] Likewise, the incident described above involving the Texas nurse was identified after she was observed to leave a partially filled syringe near a computer workstation frequently.[36] When questioned about this behavior, she admitted to reusing these syringes for more than 1 patient. Although regular audits of practice are important to ensure understanding and adherence to recommended practices, colleagues are best positioned to observe the true behavior of their coworkers on a day-to-day basis. As such, providing a mechanism for health care personnel to report concerning behavior without fear of retribution is also critical.

In addition to having mechanisms to prevent and identify unsafe injection practices, facilities must also appropriately respond if unsafe injection practices are identified. This includes immediately stopping the unsafe practice, assessing contributing factors and prevalence of the unsafe practice, assessing the risk the practice posed to patients, and taking action to ensure the practice does not continue. As part of their response, facilities should engage appropriate outside entities. For example, health departments should be consulted to assist with the risk assessment and notification of potentially exposed patients. Applicable licensure boards (eg, physician or nursing board, state board of pharmacy) should be informed to determine if action against the implicated provider's license is warranted. In situations involving drug tampering, law enforcement authorities—including local law enforcement, the Drug Enforcement Administration, and the Food and Drug Administration Office of Criminal Investigation—should also be engaged. In the drug tampering example involving the Colorado surgical technician, both law enforcement and public health

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authorities were ultimately engaged. Their ensuing investigation identified similar concerning behaviors in facilities in which the technician had previously worked. In the end, patients from 6 facilities in 4 states were notified and advised to seek bloodborne pathogen testing, and the technician was sentenced to 6.5 years in prison.[37–40,53] Unfortunately, this collaboration has not been the case in all drug-tampering events; failure to report to appropriate outside entities allowed the implicated provider to place patients at risk in other facilities and other states.[6]

The previously mentioned public health, regulatory, and law-enforcement authorities also have an obligation to appropriately respond to reports of unsafe injection practices, including appropriately collaborating to ensure a complete response that both stops the unsafe practice and addresses risk to patients. For example, if a regulatory entity, such as a state survey agency, medical, or nursing board, receives a report of syringe reuse by a provider, they should ensure that the local or state health department has also been engaged so that a risk assessment and patient notification, if warranted, can be performed. In 2014, the Centers for Medicare & Medicaid Services (CMS) formalized this expectation through a memorandum to state survey agencies and accreditation organizations requiring them to engage with state health care-associated infections programs to assist with a risk assessment and patient notification if “never events” like those previously described are identified as part of routine surveys or complaint investigations in CMS-certified health care facilities.[54] If drug diversion is suspected or identified during the course of a public health investigation, law enforcement, along with appropriate licensure boards, should be engaged while the health department continues to assist with the risk assessment and public health response. Establishing protocols and communication pathways among such entities can facilitate proper reporting and clarify roles and responsibilities.[55]

CONCLUSION

In summary, since 2001, reuse of syringes and other unsafe injection practices by health care personnel in the United States has resulted in the notification of nearly 200,000 patients. Despite guidelines and resources addressing injection safety, some providers still do not adhere to safe injection practices. Facility leadership has an obligation to ensure adherence to safe injection practices and to properly respond, including notifying patients, if unsafe injection practices are identified.

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Abbreviations and Acronyms:

CDC	Centers for Disease Control and Prevention
HCV	hepatitis C virus

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REFERENCES

1. Siegel JD, Rhinehart E, Jackson M, Chiarello L; Healthcare Infection Control Practices Advisory Committee. 2007 guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings. Am J Infect Control. 2007;35(10 suppl 2):s165–s193. [PubMed: 18068814]
2. Safe Injection Practices Coalition website. Available at: https://www.cdc.gov/injectionsafety/1anonly.html. Accessed February 4, 2019.
3. Perz JF, Thompson ND, Schaefer MK, Patel PR. US outbreak investigations highlight the need for safe injection practices and basic infection control. Clin Liver Dis. 2010;14(1):137–151. [PubMed: 20123446]
4. Patel PR, Srinivasan A, Perz JF. Developing a broader approach to management of infection control breaches in health care settings. Am J Infect Control. 2008;36(10):685–690. [PubMed: 19084163]
5. Guh AY, Thompson ND, Schaefer MK, Patel PR, Perz JF. Patient notification for bloodborne pathogen testing due to unsafe injection practices in US health care settings, 2001–2011. Med Care. 2012;50(9):785–791. [PubMed: 22525612]
6. Schaefer MK, Perz JF. Outbreaks of infections associated with drug diversion by US health care personnel. Mayo Clin Proc. 2014;89(7):878–887. [PubMed: 24933292]
7. Billings Clinic discloses drug diversion by former employee. Letter. Mar 28, 2017. Available at: https://www.billingsclinic.com/about-us/news-press-releases/2017/billings-clinic-discloses-drug-diversion-by-former-employee/. Accessed December 18, 2018.
8. Centers for Disease Control and Prevention. Outbreak of septic arthritis associated with intra-articular injections at an outpatient practice–New Jersey, 2017. MMWR Morbid Mortal Wkly Rep. 2017;66(29):777–779.
9. Adams BM. Sterilization breach may have exposed patients with HIV, Hep B, and Hep C. HIV Plus Magazine. April 6, 2018. Available at: https://www.hivplusmag.com/treatment/2018/4/06/sterilization-breach-may-have-infected-patients-hiv-hep-b-and-hep-c. Accessed December 19, 2018.
10. Centers for Disease Control and Prevention Patient Notification Toolkit. Available at: https://www.cdc.gov/injectionsafety/pntoolkit/index.html. Accessed December 19, 2018.
11. South Carolina Department of Labor. Licensing & Regulation before the South Carolina Board of Medical Examiners. Board Public Action History for Kellett, Richard Stanley. Order Date February 10, 2015. Available at: https://verify.llronline.com/LicLookup/Med/Med.aspx?div=16.&AspxAutoDetectCookieSupport=1. Accessed December 19, 2018.
12. Dental Healthcare-Associated Transmission of Hepatitis C. Final Report of Public Health Investigation and Response, 2013 Available at: https://www.ok.gov/health2/documents/Dental%20Healthcare_Final%20Report_2_17_15.pdf. Accessed December 19, 2018.
13. Coyle JR, Goerge E, Kacynski K, et al. Hepatitis C virus infections associated with unsafe injection practices at a pain management clinic, Michigan, 2014–2015. Pain Med. 2017;18(2):322–329. [PubMed: 28204717]
14. Public Health Releases Report on Santa Barbara Doctor Linked to Hepatitis C Cases. Noozhawk.com. September 29, 2015. Available at: https://www.noozhawk.com/article/public_health_inspection_report_santa_barbara_physician_linked_hep_c_cases. Accessed July 17, 2019.
15. Centers for Disease Control and Prevention. Notes from the field: investigation of hepatitis C virus transmission associated with injection therapy for chronic pain–California, 2015. MMWR Morbid Mortal Wkly Rep. 2016;65(21):547–549.
16. West Virginia Health Department FAQs. http://www.dhhr.wv.gov/oeps/disease/hai/documents/HBV-HCV_Notification/patient_FAQ.pdf. Accessed December 18, 2018.
17. Peritz T, Higgins D, Nguyen D, et al. HCV transmission among dialysis patients linked to unsafe injection practices at a vascular clinic. Paper presented at: 2017 Society for Healthcare Epidemiology of America (SHEA) Spring Conference; March 29–31. 2017 St. Louis, MO.
18. McDonald RA, Amler S, Southwick K, et al. Hepatitis C cluster in an alternative medicine practice-New York State, 2015–2017. [Abstract]. CSTE. 6 13, 2018 Available at: https://cste.confex.com/cste/2018/meetingapp.cgi/Paper/9169. Accessed December 19, 2018.

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19. Eason JT, Dunn AC, Brinton B, et al. Drug diversion associated hepatitis C investigation and response, Utah 2015. [Abstract]. CSTE. 2016 Available at: https://cste.confex.com/cste/2016/webprogram/Paper7110.html. Accessed December 19, 2018.
20. Utah Department of Health. Utah Health Status Update: Hepatitis C and drug diversion. April 2017 Available at: https://ibis.health.utah.gov/pdf/opha/publication/hsu/2017/1704_HepCDrugDiv.pdf. Accessed April 5, 2019.
21. Centers for Disease Control and Prevention. Hepatitis C virus potentially transmitted by opioid drug diversion from a nurse–Washington, August 2017–March 2018. MMWR Morbid Mortal Wkly Rep. 2019;68(16):374–376.
22. Wilson C No hepatitis C exposure at PeaceHealth Southwest, investigation finds. OPB.org. February 18, 2015. Available at: https://www.opb.org/news/article/no-hepc-exposure-at-peacehealth-southwest-investigation-finds/. Accessed December 19, 2018.
23. Lazar K Boston EMS paramedic suspected of drug tampering may have affected 57 patients. Boston.com September 30, 2012. Available at: http://www.boston.com/news/local/massachusetts/2012/09/30/boston-ems-paramedic-suspected-drug-tampering-may-have-affected-patients/McRGMDKNL6BfeWzkxzVxBK/story.html. Accessed December 19, 2018.
24. Harris C Prison nurse tied to hepatitis C exposure at Buckeye facility. Azcentral.com September 4, 2012. Available at: http://www.azcentral.com/news/articles/20120904arizona-inmates-exposed-hepatitis-c-diryt-needle.html. Accessed December 19, 2018.
25. Shaw A Colorado dental patients advised to get HIV, hepatitis testing. ABCNews.com July 17, 2012. Available at: http://abcnews.go.com/US/colorado-dental-patients-advised-hiv-hepatitis-testing/story?id=16795119. Accessed December 19, 2018.
26. Schaefer MK, Kossover RA, Perz JF. Sharing insulin pens: are you putting patients at risk? Diabetes Care. 2013;36(11):e188–e189. [PubMed: 24159184]
27. Zick J Corning Hospital nurse reused syringes; tests urged for 236 patients. The Leader. February 7, 2013. Available at: http://www.the-leader.com/x1037506491/Corning-Hospital-Nurse-reused-syringes-more-than-200-should-be-tested-for-disease?utm_source=Safe+Injection+Practices+Weekly+Digest+2%2F13%2F13&utm_campaign=WD+2_13_13&utm_medium=email. Accessed December 19, 2018.
28. Bindley K Arkansas dental patients possibly exposed to infectious material by Doctor William Jarrod Stewart. Huffington Post. April 10, 2013. Available at: http://www.huffingtonpost.com/2013/04/10/arkansas-dentist-infections-doctor-william-jarrod-stewart_n_3053269.html. Accessed December 19, 2018.
29. Mistake prompts state to test dozens for HIV, hepatitis. NBC Connecticut. August 23, 2013. Available at: https://www.nbcconnecticut.com/investigations/LWRD-220762771.html?utm_source=Safe+Injection+Practices+Weekly+Digest+8%2F28%2F13&utm_campaign=WD+8_28_13&utm_medium=email. Accessed December 19, 2018.
30. Washington State Department of Health News Release. DOH cites unsafe practices at local clinic. October 1, 2013. Available at: https://srhd.org/news/2013/doh-cites-unsafe-practices-at-local-clinic. Accessed December 19, 2018.
31. South Nassau Hospital alerting 4,247 patients of possible blood contamination. Newsday.com. March 11, 2014. Available at: http://www.newsday.com/news/health/south-nassau-hospitalalerting-4-247-patients-of-possible-blood-contamination-1.7359969. Accessed December 19, 2018.
32. Griffin Hospital: Insulin Pen Misuse Could Have Infected Patients with Diseases. The Register Citizen. May 16, 2014. Available at: http://www.nhregister.com/general-news/20140516/griffin-hospital-insulin-pen-misuse-could-have-infected-patients-with-diseases. Accessed December 19, 2018.
33. Rookie nurse causes Arizona prison HIV, hepatitis scare. Hepmag.com. January 23, 2014. Available at: http://www.hepmag.com/articles/arizona_nurse_prison_hiv_hepatitis_2831_25090.shtml. Accessed December 19, 2018.
34. York County surgical center notifies patients of possible Hepatitis & HIV risk. Fox43. May 30, 2014. Available at: http://fox43.com/2014/05/30/surgical-center-notifies-patients-of-possible-hepatitis-hiv-risk/. Accessed December 19, 2018.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

35. Bever L Nurse reused syringes during flu vaccine clinic, NJ health authorities say. The Washington Post. October 7, 2015. Available at: https://www.washingtonpost.com/news/morning-mix/wp/2015/10/07/nurse-reused-syringes-during-flu-vaccine-clinic-n-j-health-authorities-say/. Accessed December 19, 2018.
36. Arnold S, Melville SK, Morehead B, Vaughan G, Moorman A, Crist MB; Centers for Disease Control and Prevention. 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 Morbid Mortal Wkly Rep. 2017;66(9):258–260.
37. Hospitals in 4 states warn of possible exposure to hepatitis, HIV. CNN. March 17, 2016. Available at: http://www.cnn.com/2016/03/16/health/washington-surgical-tech-investigation-hepatitis-hiv/. Accessed December 19, 2018.
38. Scripps Issues Statement Regarding Surgical Technician Rocky Allen. Scripps.org. February 21, 2016. Available at: https://www.scripps.org/news_items/5671-scripps-issues-statement-regarding-surgical-technician-rocky-allen. Accessed December 19, 2018.
39. Hernandez L Fellow staffer saw tech exchange syringes. The Denver Channel website. Available at: http://www.thedenverchannel.com/news/local-news/doctor-employee-witnessed-surgical-tech-divert-fentanyl-syringe-notified-supervisor?page=2. Published February 4, 2016. Accessed December 18, 2019.
40. AZ, CO patients may be at risk for HIV, hepatitis B & C because of investigation of former employee. Abc15.com. February 3, 2016. Available at: http://www.abc15.com/news/local-news/swedish-medical-center-patients-may-be-at-risk-for-hiv-hepatitis-because-of-former-employee?page=2. Accessed December 19, 2018.
41. Dembele M Rogue ex-pharmacist may have exposed South Jersey hospital patients to HIV and hepatitis. Philadelphia Magazine. February 25, 2016. Available at: http://www.phillymag.com/news/2016/02/25/possible-hiv-exposure-nj-hospital/. Accessed December 19, 2018.
42. Division of Public Health Again Reminds Patients of Concord Medical to Get Tested. Division of Public Health. July 21, 2016. Available at: https://news.delaware.gov/2016/07/21/division-of-public-health-again-reminds-patients-of-concord-medical-to-get-tested/. Accessed March 5, 2019.
43. Investigation: 731 patients pain medications replaced with saline. HelioMetrics. October 26, 2016. Available at: http://heliometrics.net/investigation-731-patients-pain-medications-replaced-with-saline-kcci-des-moines/. Accessed December 19, 2018.
44. Des Moines hospital tells 182 more patients their painkillers might have been stolen. Des Moines Register. October 26, 2018. Available at: https://www.desmoinesregister.com/story/news/health/2018/10/26/iowa-methodist-medical-center-fentanyl-theft-182-more-patients-informed-victor-van-cleave/1778063002/. Accessed March 21, 2019.
45. Oklahoma Board of Nursing. Disciplinary Action History for Baker, John Ross. Order Date Sept 26, 2018. Available at: https://apps.ok.gov/nursing/verify/discipline_details.php?lt=R&ln=126255.
46. Allina patients notified of risk due to reused syringes. Kare11.com. March 6, 2018. Available at: https://www.kare11.com/article/news/allina-patients-notified-of-risk-due-to-reused-syringes/89-526356720. Accessed December 19, 2018.
47. Kossover-Smith RA, Coutts K, Hatfield KM, et al. One needle, one syringe, only one time? A survey of physician and nurse knowledge, attitudes, and practices around injection safety. Am J Infect Control. 2017;45:1018–1023. [PubMed: 28625701]
48. American Association of Nurse Anesthetists. Safe injection guidelines for needle and syringe Use. Adopted in April 2014. Available at: https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/safe-injection-guidelines-for-needle-and-syringe-use.pdf. Accessed January 8, 2019.
49. ASA Committee on Occupational Health Task Force on Infection Control. Recommendations for Infection Control for the Practice of Anesthesiology. Ed 3. Available at: https://www.asaht.org/~media/sites/asahq/files/public/resources. Accessed January 8, 2019.
50. Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings: Recommendations of the HICPAC. Available at: https://www.cdc.gov/hicpac/recommendations/core-practices.html. Accessed January 8, 2019.

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51. Centers for Disease Control and Prevention. Clinical reminder: insulin pens must never be used for more than one person. Available at: https://www.cdc.gov/injectionsafety/clinical-reminders/insulin-pens.html. Accessed July 9, 2019.

52. Centers for Disease Control and Prevention Injection Safety Website. Risks of Healthcare-Associated Infections From Drug Diversion. Available at: https://www.cdc.gov/injectionsafety/drugdiversion/index.html. Accessed July 9, 2019.

53. Allen Rocky, surgical tech with HIV years in prison. Denver Post. Nov 7, 2016. Available at: https://www.denverpost.com/2016/11/07/rocky-allen-surgical-tech-sentenced-prison/. Accessed March 7, 2019.

54. Centers for Medicare and Medicaid Services. Infection Control Breaches Which Warrant Referral to Public Health Authorities. Issued May 30, 2014. Available at: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Policy-and-Memos-to-States-and-Regions-Items/Survey-and-Cert-Letter-14-36.html?DLPage=1&DLEntries=10&DLFilter=Breach&DLSort=3&DLSortDir=descending. Accessed January 8, 2019.

55. Minnesota Controlled Substance Diversion Prevention Coalition. Final Report. March 2012. Available at: https://www.mnhospitals.org/Portals/0/Documents/ptsafety/diversion/drug-diversion-final-report-March2012.pdf. Accessed February 4, 2019.

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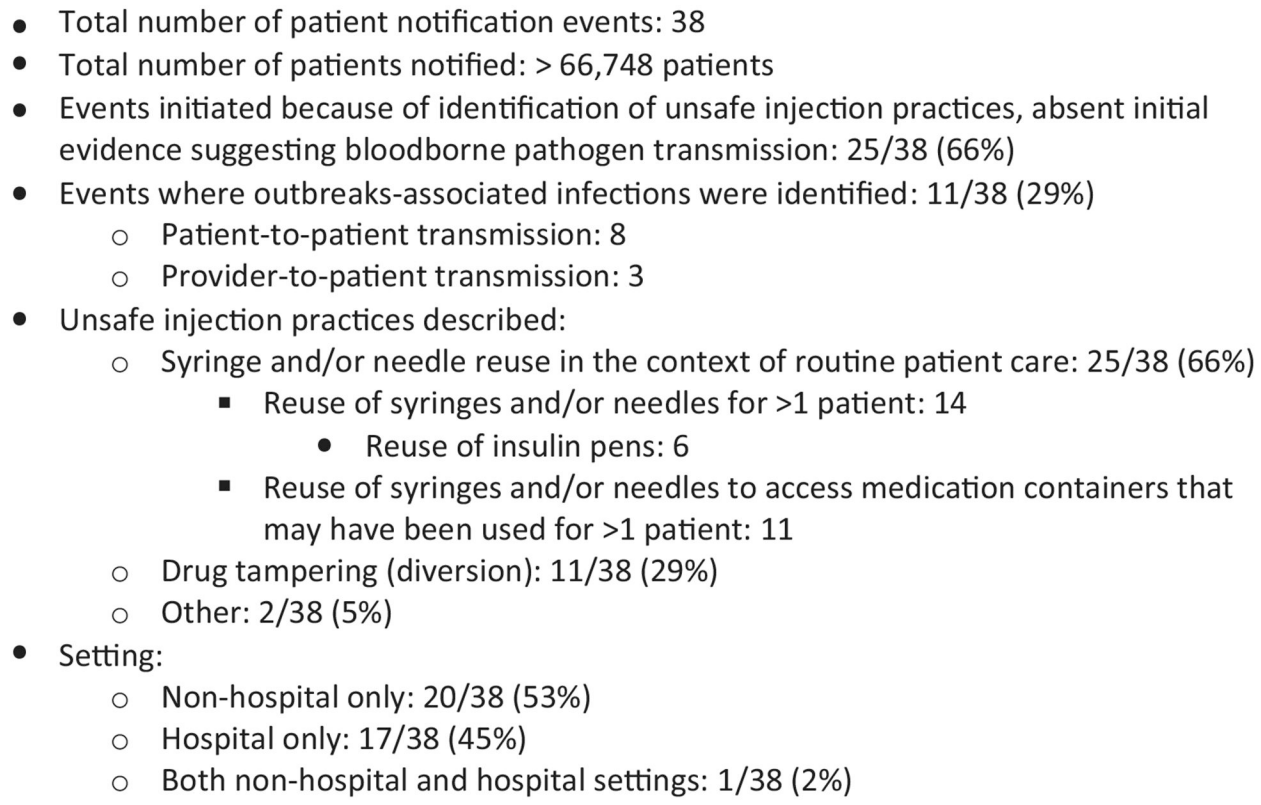

FIGURE 1.
Overview of patient notification events recommending or offering bloodborne pathogen testing because of unsafe injection practices–United States, January 1, 2012–December 31, 2018.

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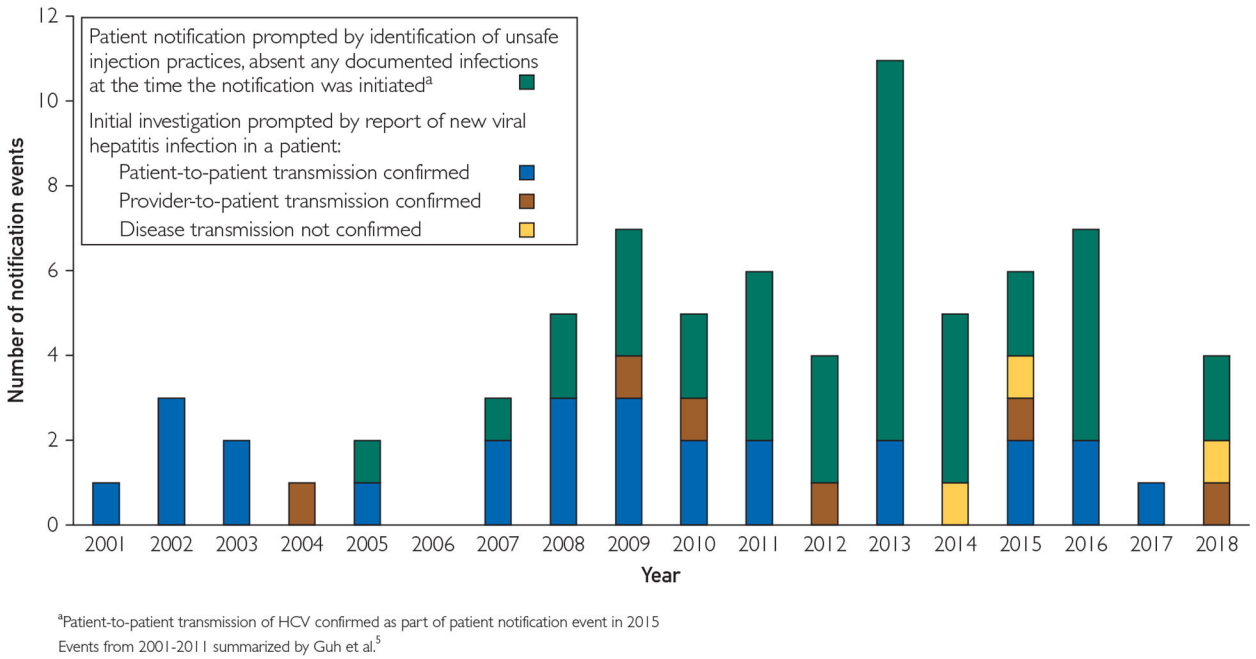

FIGURE 2.

Patient notification events recommending or offering bloodborne pathogen testing due to unsafe injection practices, by year: United States, January 1, 2001–December 31, 2018.

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TABLE.

Patient Notification Events Recommending or Offering Bloodborne Pathogen Testing Because of Unsafe Injection Practices–United States, January 1, 2012–December 31, 2018

Year of notification	State	Health care setting	Number of patients notified	Number of outbreak-associated infections (Pathogen)	Unsafe injection practice(s)[a]	Reference
A. Initial investigation prompted by report of new viral hepatitis infection in a patient						
1. Patient-to-patient transmission						
2013	SC	Pain management clinic	534	9 (HBV)	Suspected reuse of syringes to access single-dose vials of contrast and Marcaine that were used for >1 patient	11, South Carolina Department of Health & Environmental Control, unpublished data
2013	OK	Oral surgery clinic	5810	1 (HCV)	Suspected reuse of syringes and/or needles to access single-dose vials of propofol that were used for >1 patient	12
2015	MI	Pain management clinic	122	2 (HCV)	Reuse of needles and syringes to access single-dose vials of propofol that were used for >1 patient	13
2015	CA	Prolotherapy clinic	1,500	5 (HCV)	Reuse of syringes to access multi-dose vials that were used for >1 patient; use of single-dose vials for >1 patient; lack of aseptic technique when handling injection equipment and medication	14, 15
2016	WV	Cardiology clinic	2,311	8 (HCV) and 4 (HBV)	Reuse of syringes to access saline vials for an individual patient; suspected use of these single-dose vials for >1 patient	16, West Virginia Bureau for Public Health, unpublished data
2016	PA	Vascular access clinic	121	2 (HCV)	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	17
2017	NY	Alternative medicine clinic	584	8 (HCV)	Preparation and infusion of IV solutions (eg, glutathione, calcium gluconate) in an area where manipulations of blood occurred; infusions administered by an unlicensed staff member	18
2. Provider-to-patient transmission						
2012	AZ, GA, KS, MD, MI, NH, NY, PA	Hospitals	>12,000	45 (HCV)	Narcotics tampering by radiology technician	6
2015	UT	Hospitals	7217	7 (HCV)	Narcotics tampering by nurse	19,20
2018	WA	Hospital	2762	12 (HCV)	Narcotics tampering by nurse; nurse believed to have acquired HCV after injecting narcotics used on a patient with chronic HCV infection whose virus was genetically similar to the 12 newly infected patients	21

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Year of notification	State	Health care setting	Number of patients notified	Number of outbreak-associated infections (Pathogen)	Unsafe injection practice(s)[a]	Reference
3. Disease transmission not confirmed[b]						
2014	WA	Hospital	936	0	Suspected narcotics tampering by provider	22
2015	NC	Weight loss clinic	19	0	Predrawing of human chorionic gonadotropin into syringes and storing in unlabeled baggies for patients to inject daily at home	North Carolina Department of Health and Human Services, unpublished data
2018	WA	Family practice clinic	2700	0	Handling of multi-dose vials, used for >1 patient, in the patient treatment area; Possible reuse of syringes for >1 patient (Identified jar of syringes in clinic – unclear if they were new out of package or used)	Washington State Department of Health, unpublished data
B. Patient notification prompted by identification of unsafe injection practices, absent any documented infections at the time the notification was initiated[c]						
2012	MA	Emergency Medical Services	57	-	Suspected narcotics and sedative tampering by a paramedic	23
2012	AZ	Prison clinic	103	-	Reuse of needle and syringe to access multi-dose vial of insulin that was used for >1 patient	24
2012	CO	Dental clinic	8000	-	Reuse of needles and syringes for >1 patient	25
2013	NY	Hospital	716	-	Use of insulin pens for >1 patient	26
2013	NY	Hospital	1915	-	Use of insulin pens for >1 patient	26
2013	NC	Hospital	205	-	Use of insulin pens for >1 patient	26
2013	NY	Hospital	236	-	Reuse of syringes for >1 patient to flush IV tubing	27
2013	NY	Hospital	N/A	-	Suspected use of insulin pens for >1 patient	26
2013	AR	Dental clinic	100	-	Suspected narcotics tampering by a provider	28
2013	CT	Prison clinic	74	-	Reuse of needle and syringe to access multi-dose vial of insulin that was used for >1 patient	29
2013	WA	Plastic surgery clinic	415	-	Reuse of syringes to access medication vials that may have been used for >1 patient	30
2013	CO	Hospital	210	-	Suspected narcotics tampering by a provider	Colorado Department of Public Health & Environment, unpublished data
2014	NY	Hospital	4247	-	Suspected use of insulin pens for >1 patient	31
2014	CT	Hospital	3149	-	Use of insulin pens for >1 patient	32
2014	AZ	Prison clinics	24	-	Reuse of needles, that had been used to perform fingerstick procedures, to access multi-dose vials of insulin that were used for >1 patient	33

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Year of notification	State	Health care setting	Number of patients notified	Number of outbreak-associated infections (Pathogen)	Unsafe injection practice(s)[a]	Reference
2014	PA	Ambulatory surgical center	1100	-	Reuse of syringes to access medication vials that were used for >1 patient	34
2015	NJ	Pharmaceutical office	67	-	Reuse of syringes for >1 patient to administer flu vaccine	35
2015	TX	Hospital	392	1 (HCV)	Reuse of prefilled saline flush syringes for >1 patient	36
2016	AZ, CA, CO, WA	Hospitals, Ambulatory surgical center	5000	-	Narcotics tampering by surgical technician	37–40
2016	NJ	Hospital	213	-	Narcotics tampering by pharmacist	41
2016	DE	Chiropractic office	2600	-	Reuse of syringes for >1 patient	42, Delaware Health and Social Services, Division of Public Health, unpublished data
2016	CO	Hospital	49	-	Narcotics tampering by nurse	Colorado Department of Public Health & Environment, unpublished data
2016	IA	Hospital	913	-	Narcotics tampering by pharmacy technician	43, 44
2018	OK	Hospital	186	-	Reuse of needles and syringes for >1 patient	45
2018	MN	Dermatology clinic	161	-	Reuse of syringes for >1 patient	46

[a] Additional infection control lapses, including issues with untrained personnel, were identified as part of several investigations. Consult the listed references for a full summary of identified lapses.

[b] These notification events were prompted by reports of acute HCV infection; however, the investigators were unable to definitively confirm transmission at the facility.

[c] Except as noted, outbreak-associated infections were either not identified as part of patient notification efforts or information was not reliably available.

HBV = hepatitis B virus; HCV = hepatitis C virus; N/A = not available.