



Injection Safety in the United States: Miles to Go?

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Injections are an essential component of modern medicine. Pascal is credited with inventing the first modern syringe in 1650, although Roman and Greek literature alludes to syringe-like devices used both for medical procedures and for nonmedical purposes such as changing the pitch of musical instruments.¹ Francis Rynd, an Irish physician, invented the hollow metal needle and used it to administer the first recorded subcutaneous injections in 1844. Today, needles and syringes are used for prevention (vaccines), diagnosis (contrast material, radioactive isotopes, and blood tests), and treatment (antibiotics, chemotherapy, insulin, sedatives, pain medications, and fluids) in various health care settings. The World Health Organization estimates that worldwide more than 12 billion injections are given each year, making injections one of the most common medical procedures. Injection safety is an important component of Standard Precautions, a set of infection control practices that are to be used in the care of all patients regardless of their diagnosis/perceived infectivity. When safe injection practices are not followed, transmission of blood-borne pathogens and other types of infection can occur. In this issue of *Mayo Clinic Proceedings*, Schaefer et al² from the Division of Healthcare Quality Promotion of the Centers for Disease Control and Prevention summarize patient notification events related to unsafe injection practices in US health care facilities between 2012 and 2018. During this time period, more than 65,000 patients were notified of potential exposure to blood-borne pathogens in 38 separate events. A total of 91 cases of hepatitis C infection and 9 cases of hepatitis B infection were identified as a result of these exposures. Events that occurred as a result of health care workers diverting patient medications for their own use involved thousands of patients and resulted in the highest number of transmissions. Worldwide, the situation is even

worse. It is estimated that in 2010, unsafe injections resulted in approximately 34,000 human immunodeficiency virus infections, 300,000 hepatitis C infections, and 1.6 million hepatitis B infections.³ In addition to blood-borne pathogen transmission, there are other negative consequences. There have been outbreaks of bacterial and fungal infections, several of which have resulted in deaths. Considerable health care resources are expended in identifying exposed patients, communicating with them, and arranging for testing and managing infections. Each notification results in acute anxiety in the recipient of the notification, which can last for weeks to months until testing is completed.

In response to several large outbreaks of viral hepatitis, the Safe Injection Practices Coalition launched the “One and Only Campaign” in 2009 to raise awareness about injection safety.⁴ The Safe Injection Practices Coalition is a partnership of health care–related organizations, patient advocacy organizations, industry partners, and other public health partners led by the Centers for Disease Control and Prevention. The campaign focuses on educating both health care personnel and the public and encourages patients to ask about measures being taken to minimize the risk of infection transmission. The tagline “One Needle, One Syringe, Only One Time” is aimed at the most common mistakes made, that is, reuse of needles/syringes and use of single-dose medications in more than 1 patient. Over time, the campaign also addressed additional areas including insulin pen safety, safe blood glucose monitoring, and precautions for spinal injections and joint injections. The campaign has emphasized infection control in outpatient settings such as ambulatory surgery centers and oncology and endoscopy practices. Several tools including checklists to assess adherence to recommended best practices have been made available. Has this had an impact?

Between 2001 and 2011, approximately 130,000 patients were notified in 35 events.⁵ Most (63%) of these notifications happened after hepatitis B or C transmission was recognized, and 83% of the events occurred in outpatient settings. In contrast, in the report in this issue,² most notifications (65%) were prompted by the identification of unsafe injection practices alone. This is encouraging in that it suggests increased monitoring of injection practices, heightened awareness of the risks associated with unsafe injections, and commitment to communication of medical errors to patients. Approximately half of the events between 2012 and 2018 occurred in the outpatient setting compared with two-thirds in the earlier time period. This shift may be partly due to the more widespread dissemination of the One and Only Campaign in outpatient settings and the increased scrutiny of infection control practices, particularly in ambulatory surgery centers, by regulatory agencies. There has been an increase in the prevalence of substance abuse in health care workers, in parallel with the increasing use of opioids in the general population. Drug diversion by health care workers tends to occur primarily in hospitals. This may account for the increase in hospital-based events.

In both time periods, the most common infection prevention breach was the inappropriate reuse of syringes. A recent survey of physicians and nurses was performed in 8 states 3 years after the launch of the One and Only Campaign,⁶ which revealed that only 22% of the survey respondents had heard of the campaign. Overall 12% of physicians and 3% of nurses reported that syringes are reused in their workplace, while an alarming 24% of oncologists reported syringe reuse. Inadequate staffing, suboptimal training, and lack of safety needles and single-dose medications were among the barriers to injection safety reported in ambulatory care.^{7,8}

Clearly, there is still much work to be done. The authors recommend numerous

strategies to prevent these “never events” and emphasize that every health care professional has an obligation to both practice injection safety and report unsafe practices. Collaboration between health care facilities and public health authorities is essential along with the involvement of medical licensure boards and law enforcement when drug diversion is implicated. Finally, hepatitis B vaccination of at-risk populations and screening and treatment of hepatitis B and C- and HIV-infected individuals can also reduce transmission. We owe it to our patients to truly make these “never events.”

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Potential Competing Interests: Dr. Sampathkumar is a member of a Data Safety Monitoring Committee for Merck.

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