“The exception that proves the rule …”

This often-misunderstood English language idiom, at least in its “loose rhetorical sense” [1], is highly applicable to the transmission from providers infected with blood-borne pathogens to their patients (ie, the rarity of these events helps characterize and define the miniscule risk for these transmissions in the practice of modern medicine).

Decades of experience have taught us that providers infected with blood-borne pathogens pose a small but nonetheless detectable risk to their patients, specifically when the provider is performing what have now been termed “exposure-prone invasive procedures” on patients. Because of this small but clearly detectable risk, particularly for providers infected with the hepatitis B virus (HBV), the optimal management of healthcare providers infected with blood-borne pathogens has been controversial. The risk for provider-to-patient transmission is so small that it cannot be measured with precision, and the small numbers of instances of provider-to-patient transmission of HBV, in essence, provide evidence for the “rule” that such transmissions are remarkably rare.

In 1991, in great measure in response to the occurrence of 6 cases of iatrogenic human immunodeficiency virus (HIV) transmission in the practice of a Florida dentist [2–4], the Centers for Disease Control and Prevention (CDC) issued guidelines recommending that healthcare workers who are infected with HIV or HBV and who have circulating hepatitis B e antigen (HBeAg) and who desire to perform such exposure-prone procedures can continue to perform such procedures only after first notifying the patient of the healthcare provider’s infection as well as after consulting an expert review panel to determine, “under what circumstances, if any, they may continue to perform these procedures” [5]. These guidelines remained as the practice standard in the United States until 2010 when the Society for Healthcare Epidemiology of America (SHEA) published new recommendations about the management of providers infected with blood-borne pathogens [6]. Subsequently, in 2012, the CDC published “Updated CDC Recommendations for the Management of Hepatitis B Virus–Infected Health Care Providers and Students” [7]. These new, sentient guidelines represented a substantial departure from the prior US Public Health Service guideline published in 1991 [5] and now provide a clear approach to this problem for hospital, health departments, and occupational medicine providers.

In this issue of Clinical Infectious Diseases, Enfield and coworkers report another well-documented instance of provider-to-patient transmission of HBV—documenting at least 2 instances of transmission of HBV to the patients of an HBV-infected orthopedic surgeon who also had a high circulating viral burden [8].

In 2012, such cases are clearly exceptional in the true sense of the word. Transmission of blood-borne pathogens from providers to patients has become exceedingly rare. The development and wide implementation of hepatitis B immunization, both specifically for healthcare workers as well as for the population at large, has had a profound influence on the prevalence of this blood-borne infection in the United States. Nonetheless, the influx of practitioners into the US healthcare delivery milieu from areas in the world where the prevalence of HBV infection is high (and, therefore, the likelihood of transmission from mothers to newborns is high, producing a significant population of individuals who have high circulating viral burdens and little evidence of liver disease) has provided an influx of US healthcare providers who are chronically HBV infected and who have high circulating HBV viral burdens. Whereas such practitioners do present a risk for transmission to patients during the conduct of exposure-prone procedures, the development of highly effective antiviral therapy for this infection provides a mechanism for reducing such practitioners’ circulating viral burdens, thereby minimizing the risk for transmission.
Fortunately, the prospects for successful treatment of all 3 of the major blood-borne pathogens have increased dramatically over the past 2 decades.

Several points about the instances of transmission of HBV described by Enfield and colleagues are worthy of additional emphasis. First, the provider who transmitted these infections was unaware of his infection status. In the year 2012, in my view, all providers who conduct these types of procedures on patients have an obligation to be aware of their infection status with respect to all 3 of the major blood-borne pathogens—hepatitis B, hepatitis C, and HIV—and, if they find themselves to be carriers of one of these pathogens, they should seek the counsel of the expert review panel in their institutions or health department jurisdictions. This process is detailed in the 2010 SHEA guideline [6] as well as in the 2012 CDC guideline [7]. A second point worthy of emphasis is the fact that the infected provider in the Enfield et al study had failed to respond to 2 complete courses of hepatitis B immunization. This finding should be an immediate “red flag” and should raise the possibility of chronic HBV infection in the provider in the minds of the staff administering the vaccine. This finding should be communicated to the director of the occupational medicine program. In every instance this finding should require follow-up on the part of the occupational medicine staff to make certain that the provider is not a chronic HBV carrier. A third point worthy of emphasis is that the provider in question had immigrated to the United States from an area in which HBV infection is endemic. This finding, particularly in the setting in which the provider previously has failed to respond to 2 full courses of hepatitis B immunization, should underscore the need for further follow-up.

Despite the fact that this surgeon was performing exposure-prone procedures, had a very high circulating HBV viral burden (>10⁶/mL), and was found to be HBeAg positive (both of the latter circumstances would, if known in advance, likely have precluded his conduct of exposure prone procedures), definite transmissions occurred to only 2 of the patients who received follow-up. As many as 6 additional patients may have acquired infection, but from the current article, we have no way to know which, if any, of these patients may have acquired their infections from the surgeon.

According to Enfield et al, the surgeon’s peers and supervisors thought he had excellent surgical technique. The low rate of transmission observed in this setting may relate to a number of factors, among them that the surgeon had excellent technique and routinely double-gloved in his surgical practice, and that, even in these types of higher-risk settings, blood exposures from providers to patients occur infrequently.

The authors note that “no incidents of percutaneous exposure, glove perforation, or other breaches in surgical technique were identified during the investigation.” Such a finding is not surprising, given the retrospective nature of their investigation and that, during these cases, one can only assume that no one had heightened awareness about the risk for provider-to-patient transmission. The authors suggest that “unknown or microperforation of the glove might have occurred,” resulting in patient exposures to the provider’s blood. Whereas this explanation is completely plausible, this assumption is speculative. Despite the advances in surgery, surgical techniques, and medical devices, and in great measure because of the rarity of these events, we still have limited insight into the precise mechanisms responsible for provider-to-patient transmission of blood-borne pathogens.

The authors also emphasize the limitations of their study: its retrospective nature and incomplete follow-up of potentially exposed patients, resulting in the potential for responder bias as well as recall bias on the part of those retrospectively interviewed. Despite these limitations, the report by Enfield et al is important for several reasons: their thorough attempts to understand the events associated with transmission; the careful molecular studies that document the transmission events with certainty; the fact that the provider implicated in transmission had a high circulating HBV viral burden, reinforcing the management approach advocated in the SHEA [6] and CDC [6] guidelines; and the fact that this represents the first such case reported in the literature in several years.

Even in the face of the rarity of such events, managing providers infected with blood-borne pathogens remains something of a balancing act (ie, balancing between unnecessarily punitive practice restrictions and unacceptable levels of patient risk). The basic management principles, however, remain unchanged: a provider conducting exposure-prone procedures must be aware of her/his infection status for all 3 major blood-borne pathogens. If the provider is found to be infected with any of these viruses, the provider should both seek treatment for the infection and seek the counsel of this institution’s expert review panel or public health authorities to make certain that risks to patients can be minimized. Closely adhering to these principles will assure that these “exceptional” events become even more rare.

**Note**

**Potential conflicts of interest.** The author certifies no potential conflicts of interest.

The author has submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

**References**