

## Editorial

# Healthcare Behaviors and Risky Business: First, Do No Harm

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In an opinion piece entitled "Risky Business," which was published in *Infection Control and Hospital Epidemiology* in 1990, Susan Beekmann, Barbara Fahey, Julie Gerberding, and I wrote about the subject of occupational risk for blood-borne pathogen transmission in the healthcare setting.<sup>1</sup> In that piece, we presented a table suggesting a group of prevention strategies that we believed could help mitigate some of the risks associated with managing patients infected with hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), and other blood-borne pathogens in healthcare settings (Table).

In 1999, the Institute of Medicine of the National Academy of Sciences published an assessment of patient safety in U.S. healthcare institutions.<sup>2</sup> The Institute of Medicine report was entitled "To Err Is Human." This report underscored the frequency of adverse events in healthcare and emphasized the importance of getting healthcare workers to modify ingrained behaviors to improve patient safety and to mitigate risk in the healthcare setting.<sup>2</sup>

The first information about the acquired immunodeficiency syndrome (AIDS) was published in the Centers for Disease Control and Prevention's *Morbidity and Mortality Weekly Report* on June 6, 1981.<sup>3</sup> Because of the striking similarities between the epidemiology of this new syndrome and that of HBV, concern arose almost immediately about the risks for occupational and nosocomial transmission.<sup>4</sup> As early as 1986, documented episodes of occupational infection were reported in the literature.<sup>5</sup> Despite an awareness—as early as 1949—of the occupational hazards associated with handling blood from, and managing patients infected with, HBV,<sup>6</sup> the healthcare profession had never seriously addressed issues related to workplace safety in a systematic way before the HIV epidemic. Interest in worker safety had just begun to develop concomitant with the marketing of the original HBV vaccine in the late 1970s, but this interest was truly galvanized by the HIV epidemic.

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**TABLE\***  
STRATEGIES TO PREVENT OCCUPATIONAL EXPOSURES AND INFECTIONS WITH BLOOD-BORNE PATHOGENS

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Thoughtful, consistent use of standard/universal precautions
Retraining staff about occupational risks
Modifying procedures intrinsically associated with risk
Modifying medical or nursing school curricula
Development and use of technology to reduce exposure risk
Development of effective post-exposure chemoprophylaxis
Immunization

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\*Modified from reference 1.

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The ensuing 25 years have seen a variety of interventions designed to facilitate both decreasing risks and "doing no harm" in the healthcare setting.

In some respects, as a profession, we have come to understand these risks far better than one might have ever imagined in the early 1980s. That's the good news. The bad news is that we continue to struggle on a daily basis with what must now be considered "routine" practice issues relating to the transmission of blood-borne pathogens in the healthcare setting. What must be considered simply "bad behaviors" continue to occur in our workplace on a far-too-frequent basis. As is so often the case in medicine, progress is incremental and not necessarily linear.

This issue of *Infection Control and Hospital Epidemiology* contains no fewer than seven articles addressing various aspects of patient and healthcare worker safety relating directly to the presence of blood-borne pathogens in the healthcare environment. Unfortunately—from both the risky business and the first, do no harm perspectives—much of the news in this issue is not good. Four of these articles describe epidemics of blood-borne pathogen infections among patients receiving healthcare in four different

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clinical settings. In each of these articles, the assumption is that healthcare providers facilitated infection transmission through the use of procedures that could well be categorized as risky business.

The first of these articles describes a large outbreak of HBV infections among patients receiving treatment at a private physician's office.<sup>7</sup> The epidemic was identified when two low-risk patients were detected as having acute HBV infection. These two patients had no identifiable risk factors for HBV infection, but did attend the same physician's practice. Despite using a variety of approaches to identify potential cases in the cluster, the investigators could evaluate fewer than 25% of the potentially exposed individuals. Their inability to evaluate three-fourths of the population at risk is a serious limitation for this study. Nonetheless, they found that 38 patients had serologic or clinical evidence of recent HBV infection, but were able to interview only 24 of the 38. The investigators conducted a cohort study to demonstrate that the receipt of injections in the physician's office was strongly associated with hepatitis (only the number of injections received was significant among the potential risk factors entered into their multiple logistic regression model). The investigators also found that most of the medications administered in this office were ordered in multidose vials, that these vials were used for multiple patients, and that these vials also were entered by at least one staff member without changing needles. For the epidemic to occur in the first place, work practices and infection control procedures in this clinic must have been inadequate.

The authors of this article make no comment on the physician's practice, except to state that he failed to report the case of acute HBV infection that he observed.<sup>7</sup> The medications most frequently administered in this practice were vitamin B12, atropine, and dexamethasone in injections that combined two of these agents or all three in one syringe.<sup>7</sup> These medicines accounted for 90% of the injections in this practice. The medical and clinical rationale for the administration of these injections is neither provided nor discussed, but must be considered, especially from the first, do no harm perspective.

In a second article, from Lyon, France, Savey et al. describe a large outbreak of HCV infections among 70 patients attending a private hemodialysis center in France.<sup>8</sup> Before the epidemic, the prevalence of HCV infection among patients attending the center was 10.2%. In 2001, 22 instances of HCV seroconversion (involving fully 36% of the susceptible patients attending the center) were identified. Patients became infected with four distinct genotypic variants of HCV in the epidemic, and the occurrence of infection with a distinct subtype was associated with distinct dialysis patterns (ie, the specific days of the week on which dialysis occurred). Two serious limitations of this study are (1) that the authors were able to evaluate the HCV infection statuses of only 10 of 35 healthcare workers who provided care in the center during the epidemic and (2) that the investigators were not able to observe the practices of healthcare workers directly, as the center had been closed as a direct result of the epidemic. Nonetheless, in their in-

vestigation, the authors found several breaches of expected infection control practice in this dialysis center. The authors speculate that a variety of factors likely contributed to the epidemic—disorganization of care, reduced space for care, understaffing, high rates of staff turnover, and inadequate training.

In a third article, Faustini et al. report a cluster of HCV infections associated with the transfusion of autologous, ozone-enriched blood in Rome, Italy.<sup>9</sup> In this study, the identification of three individuals newly diagnosed as having HCV and the realization that all three had received ozone-enriched autologous blood transfusions at the same hospital on the same day prompted an epidemiologic investigation. The rationale for ozone therapy is not discussed, but the authors do provide two references for the practice. Again, the rationale for this clinical practice is not discussed, but must be considered, especially from the first, do no harm perspective. This study has several limitations, as well. First, the authors really do not know how this unique treatment modality contributes to the risk for infection, they can only surmise. Second, the kinetics of infection implied in the article simply cannot explain what happened. The one specific day in which all three of the patients received ozone treatments was only two or three days before the diagnosis of hepatitis in one of the three—clearly leaving inadequate incubation time for this infection. On balance, however, as is the case for the two articles discussed above, the almost inevitable conclusion to be reached from this investigation is that the practice of ozone-enriched autologous transfusion was associated with risk for HCV infection, and that cross-contamination with HCV was somehow associated with this practice.

The concise communication by Germain et al. from France in this issue of *Infection Control and Hospital Epidemiology* describes a cluster of three HCV infections in a surgery practice.<sup>10</sup> These clustered infections were related to use of multidose vials by the anesthesia staff. The anesthesiologist reported it likely that several injections from two separate vials of fentanyl delivered to the first patient were prepared using the same syringe and needle. The second vial was reused on the other three clustered patients. In addition, the authors note that review of infection control procedures identified that injections were administered directly into peripheral venous catheters that did not have in-line anti-reflux valves:

Thus, these four articles underscore that—despite the emphasis on preventing transmission of blood-borne pathogens in the healthcare setting for the past two decades—the healthcare workers who were caring for the patients in these four centers used inadequate, and sometimes even slipshod, infection control procedures. This lack of attention to the appropriate details of infection prevention stands a substantial risk to do harm to patients and simply must be viewed as unnecessary risky business.

This issue of *Infection Control and Hospital Epidemiology* also contains two additional articles that raise "red flags" for those of us interested in trying to prevent the transmission of blood-borne pathogens in the healthcare

setting. The first of these articles, by Shah et al., provides a detailed analysis of the comparative rates of hospital-based and non-hospital-based healthcare workers' compensation claims for needlestick injuries in the state of Washington from 1996 through 2000.<sup>11</sup> This descriptive study contains several pieces of disquieting news. First, the investigators noted a steady increase in compensation claims for needlestick injuries occurring among healthcare workers working in non-hospital settings. Although they noted a small, but statistically insignificant, decrease in injuries among hospital-based healthcare workers, the investigators also noted that their data collection was incomplete. The fact that no decrease in injuries and occupational exposures could be detected in this 5-year period is discouraging.

In this study, disposal of used needles and recapping of needles were most frequently associated with needlestick exposures for non-hospital-based healthcare workers. In the context of our experience during the past 15 years in managing occupational exposures to blood-borne pathogens in the healthcare setting, this finding seems (to paraphrase the words of former New York Yankee catcher Yogi Berra) "like déjà vu all over again." Thus, despite the enormous investment in training of healthcare workers who have the potential for exposure to blood in the workplace, and despite substantial investment in, and development of, safer technologies, these injuries and exposures continue to occur at an alarming rate.

El-Far et al. evaluated the rate of antiretroviral resistance among isolates of HIV in source-patients for needlestick exposures in Sao Paulo, Brazil.<sup>12</sup> In this small study, the authors were able to evaluate the genotypic resistance patterns of HIV isolates from 18 patients whose blood or body fluids served as the source of occupational exposures and from 26 additional patients considered "potential sources for accidents." They found that 18 of 44 individuals had isolates with genotypic resistance to either nucleoside analogues, protease inhibitors, or both. These investigators suggest that this finding calls into question the use of recommended post-exposure prophylaxis regimens to which the isolates with genotypic resistance might not be susceptible. Although these data definitely do raise concern, no instances of transmission were documented in this admittedly very small study. One additional distressing finding from this study was the fact that two of the source-patients who had never had any exposure to antiretroviral agents had HIV isolates that had genotypic resistance to one or more antiretroviral agents.

I would caution that the clinical relevance of genotypic resistance to failure of post-exposure chemoprophylaxis is only loosely connected. On consideration of the mechanisms of action of the various classes of antiretroviral drugs, virtually none of them are intuitive candidates for prophylaxis. Even in 2005, I believe we have an extremely limited understanding of how these agents prevent infection. A fascinating article by Pope et al. demonstrated that the *in vitro* infectivity of HIV-pulsed dendritic cells for susceptible T cells was blocked by the addition of a nucleoside analogue.<sup>13</sup> Further, when Sperling et al. reanalyzed

the genotypic resistance patterns from the mothers in the AIDS Clinical Trials Group Protocol 076 trials of zidovudine administered to attempt to prevent maternal-fetal transmission of HIV, no correlation could be found between zidovudine resistance and transmission.<sup>14</sup>

This issue of *Infection Control and Hospital Epidemiology* does contain a little good news. Landrum et al. describe the effective use of the OraQuick Rapid HIV-1 Antibody Test (OraSure Technologies, Bethlehem, PA) to evaluate source-patient infection status and compared their findings with enzyme-linked immunosorbent assay tests.<sup>15</sup> Although this test is not approved by the Food and Drug Administration for use with serum, it performed admirably in this study when compared with traditional test methodology. These investigators also found that the use of the rapid test reduced both costs and healthcare worker anxiety, although they acknowledge that the findings relating to decreases in healthcare worker anxiety could easily be subject to recall bias.

The healthcare workplace is far from risk free. The past two decades have seen a remarkable investment of effort and resources in an attempt to mitigate the risk for transmission of blood-borne pathogens in healthcare settings. This issue of *Infection Control and Hospital Epidemiology* demonstrates that we have a long way to go to reduce risks and to increase patient safety in the healthcare environment. Five of these articles emphasize that in the 15 years that have elapsed since our "Risky Business" article was published, we have not accomplished even the first of the seven strategies that we identified in that article. Several safer devices have found their way into the healthcare workplace in the past 15 years, and implementation of these devices has reduced risks for some types of occupational exposures. The use of needleless intravenous devices, for example, has clearly reduced occupational needlestick exposures, but may have had an adverse effect on bacteremia rates.<sup>16,17</sup> Healthcare worker safety must, of necessity, not adversely affect patient safety or patient care.

Whereas we have learned a great deal about the epidemiology of, and factors contributing occupational and nosocomial risk for, occupational exposures to blood, we have made little progress in developing strategies that make it possible to alter long-term habits and ingrained healthcare worker behaviors that are associated with risk for transmission of blood-borne pathogens to the healthcare workers themselves and their patients. Especially in instances in which staffing ratios are less favorable and workloads are increased, maintaining the consistent, sentient use of basic standard/universal precautions as well as the principles of aseptic technique have proved to be significant challenges for all of healthcare. Lack of adherence to these sensible guidelines contributes unnecessary risk in our workplace. This issue of *Infection Control and Hospital Epidemiology* demonstrates conclusively that blood-borne pathogen risks are bidirectional and that patient safety may be substantially compromised as a result of "corner-cutting" and "shortcuts" in healthcare.

The “wake-up” call that was provided by the Institute of Medicine’s report on patient safety in U.S. healthcare underscores the necessity that the healthcare industry develop new strategies for ensuring compliance with appropriate aseptic techniques, basic infection control procedures, and standard/universal precautions. We simply must intensify our focus on both goals—increasing patient safety and decreasing occupational risks.

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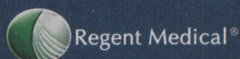
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