topics unique to the United States audience as well as practical considerations that may not be addressed due to the paucity of information available about the factors that influence the risk for HCP-to-patient transmission. The recommendations contained herein are best characterized as expert opinion and consensus within the context of the literature available.

No guideline, expert guidance, or white paper can anticipate all situations, and this document is not meant to be a substitute for individual judgment of qualified professionals or oversight panels. In addition, since laws vary from state to state in the United States, we have not made an effort to address the differences in state laws and regulations. Both HCP and those involved in the oversight of HCP living with HBV/HCV/HIV should be aware of state and local laws governing these issues.

Methods

This document was developed by a multidisciplinary panel of experts in infectious disease, HIV, hepatology, surgery, occupational health, and ethics. As noted, unlike the SHEA expert guidance format, this document is not based on a systematic literature search and review but builds on recent evidence-based guidelines to provide practical recommendations important to healthcare practice. This document was reviewed by the SHEA Guidelines Committee (GLC), the SHEA Publications Committee, the Infectious Diseases Society of America (IDSA) Standards and Practice Guidelines Committee (SPGC), the HIV Medicine Association (HIVMA), and the Surgical Infections Society (SIS). This white paper has been endorsed by SHEA, IDSA, HIVMA, and SIS.

Authors

The authors consist of authors of the 2010 SHEA guideline, current and past members of the SHEA Guidelines Committee, members of the SHEA Board, experts in the epidemiology and management of these bloodborne infections, and individuals representing HIVMA and IDSA. All authors are involved at their respective institutions in the development of policies relevant to management or treatment of bloodborne pathogens, either directly or in an advisory role.

For convenience, we also include a direct web link to the 2010 SHEA guideline.

Questions and Answers

Epidemiology and pathogenesis of HCP-to-patient transmission

Question: What factors contribute to the pathogenesis and risk for transmission of HIV, HCV, and HBV from HCP to patients?
Answer: Virtually no new information has surfaced about the healthcare-associated epidemiology, pathogenesis, or transmission of HBV, HCV, and HIV since the publication of the 2010 SHEA guideline. As noted in the introduction, with the exception of cases linked to HCP substance use,[19-27] literature reports documented no new cases of HIV, 3 cases of HCV,[28-30] and 2 cases of HBV transmission from HCP to patients.[14,15] The contribution of HCP substance use to HCP-to-patient HCV and HBV cases should not be overlooked. When transmission is documented, HCP substance use must be considered and excluded. In addition, staff should be made aware of institution-based HCP substance use detection programs.[36] Nonetheless, with perhaps the exception of the relatively new issue of the opioid epidemic involving HCP, the few instances of transmission provided limited new insights about the factors that influence transmission.

The 5 factors identified by the 2010 SHEA guideline as contributors to the pathogenesis and transmission risk for HBV, HCV, and HIV remain:

1. The intrinsic transmissibility of a specific pathogen
2. The frequency with which HCP sustain injuries that may present a risk for transmission of bloodborne pathogens to HCP
3. The frequency of occupational exposure events resulting in injuries that might present a risk for bloodborne pathogens transmission from HCP to their patients
4. The viral load in HCP living with HBV, HCV, and/or HIV and
5. The magnitude of risk of transmission of bloodborne pathogens following various types of exposure events.

Additionally, several procedural and technological interventions introduced to the healthcare environment (eg, blunt-tipped suture needles, needleless connectors, self-sheathing needles, etc) were designed to decrease risks for any kind of occupational exposures and, therefore, HCP-to-patient exposures. Although the precise efficacy of each of these interventions on HCP-to-patient transmission risk cannot be estimated, their net effect is likely to have made the healthcare environment safer, thereby decreasing the frequency of any occupational exposure.[37,38] Finally, with respect to an HCP's viral load, improvements in the therapy of these infections have significantly lowered viral loads in HCP living with HBV or HIV, which has resulted in the cure of HCV in nearly all individuals, thereby reducing risk for transmission in the unlikely event of a patient exposure.

Terminology and measurement

1. Viral load thresholds

Question: Given the medical progress made in the treatment or cure of these viral infections over the past decade, what modifications for determining viral load thresholds for any restrictions on HCP practice are advisable? Should these thresholds, if any, consider fluctuations in viral loads ("blips") that are known to occur?
Answer: The issue of viral nucleic acid quantification for HBV, HCV, and HIV remains challenging because different assay methodologies provide differing results. No uniform agreement exists about the conversions of genome equivalents per milliliter (GE/mL) to international units for HBV, HCV, or HIV. However, similar to the methods used by the authors of the PHAC guideline,[8] the authors of this manuscript recommend using the following thresholds:

- For HBV, 1,000 IU, using the World Health Organization (WHO) conversion for GE/mL to international units (5 GE/mL = 1 IU/mL). This threshold, which was arbitrarily set in the SHEA 2010 guidance[1] at 10^4 GE/mL has now been modified to 1,000 IU (ie, ~5×10^3 GE/mL), consonant with the Canadian guidelines.[8]
- For HCV: 'HCV RNA undetectable' (ie, implying a SVR, or cure, defined in the following section). Effective, and most often curative, therapy is now available.
- For HIV: 'suppressed viral RNA.' In the United States, viral suppression typically means an HIV viral load <200 copies/mL. Suppressive therapy is now widely available.

The question of how to manage the extremely small subset of HCP living with HCV for whom therapy can suppress viral loads but cannot achieve SVR is complex. This set of circumstances occurs