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# Occupational Health Update

## Approach to Evaluation of Health Care Personnel and Preexposure Prophylaxis



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### KEYWORDS

- Occupational health • Health care personnel • Vaccines • Immunization
- Preexposure prophylaxis

### KEY POINTS

- Health care personnel (HCP) are at risk of exposure to infectious agents depending on their job duties and other factors.
- Effective occupational health services (OHS) programs are a key aspect of preventing exposure to infectious agents and subsequent infection.
- HCP must be educated on proper handling of sharps, early identification and isolation of potentially infectious patients, and implementation of standard and transmission-based precautions, including hand hygiene.
- OHS must ensure immunity to vaccine-preventable diseases.

### RISKS TO HEALTH CARE PERSONNEL AND THE ROLE OF OCCUPATIONAL HEALTH SERVICES

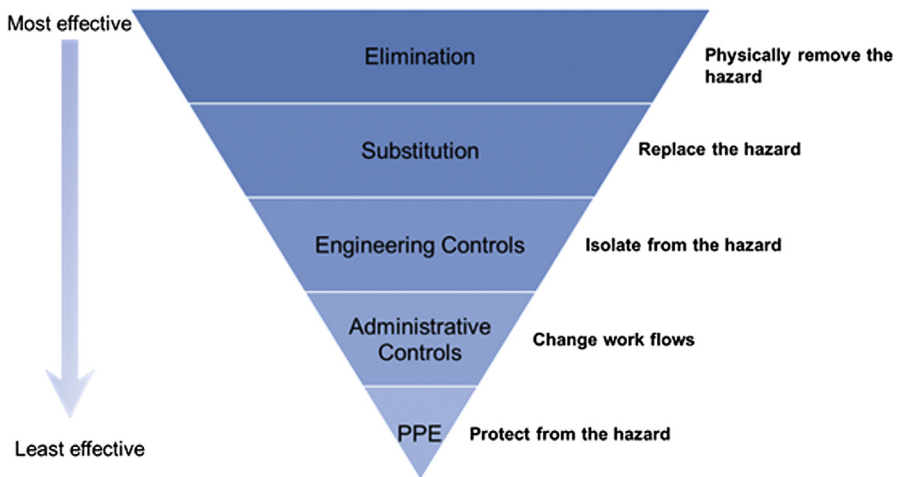
Health care is one of the fastest-growing sectors of the US economy, employing more than 20 million persons.<sup>1,2</sup> Health care personnel (HCP) face a range of noninfectious hazards on the job, including back injuries, strains and sprains, latex allergy, violence, and stress.<sup>3</sup> HCP are at risk of exposure to infectious agents depending on their job duties and other factors. Risks include percutaneous exposure to blood-borne pathogens (BBP) via sharp injuries (eg, human immunodeficiency virus [HIV], hepatitis B virus [HBV], hepatitis C virus [HCV]); exposure by direct contact, droplet, or

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airborne-transmitted pathogens through direct patient care (eg, pertussis, meningococcal infections, tuberculosis); and indirect contact through transmission related to the contaminated health care environment (eg, *Clostridioides difficile*). Cases of nonfatal occupational injury and illness among HCP are among the highest of any industrial sector.<sup>3</sup> Approaches to preventing occupational acquisition of infection by HCP have been reviewed, and include implementation of the Hierarchy of Controls to assess implementation of feasible and effective control solutions.<sup>4–7</sup> The Hierarchy of Controls (Fig. 1), developed by the National Institute of Occupational Health and Safety (NIOSH), is a framework to assess the effectiveness of interventions to reduce hazards in the workplace and the risks of injury or illness.<sup>8</sup>

Minimizing the risk of communicable disease acquisition is based on 6 key recommended practices: (1) proper training of HCP at initiation of health care practice and annually (eg, infection prevention practices, sharp injury prevention, no eating or drinking in areas where care is delivered); (2) ensuring immunity to vaccine-preventable diseases<sup>4,6,7,9–11</sup>; (3) evaluation of HCP who were exposed to communicable diseases for receipt of postexposure prophylaxis (PEP)<sup>6,7,12–14</sup>; (4) adherence to standard precautions when providing patient care,<sup>15</sup> especially the performance of appropriate hand hygiene before and after patient care<sup>16–18</sup>; (5) rapid institution of appropriate transmission-based precautions for patients with a known or suspected communicable disease as part of the identify-isolate-inform framework<sup>19–23</sup>; and (6) proper use of personal protective equipment, such as surgical or procedural masks, N-95 respirators (including respiratory clearance and fit testing), eye protection, gloves,



**Fig. 1.** The hierarchy of controls. Interventions at the top of the hierarchy can potentially be more effective than those at the bottom. Elimination and substitution strategies are highly effective but can be difficult to implement. An example of an effective elimination strategy is vaccination. Engineering controls are designed to remove a hazard before the hazard comes in contact with the worker. Use of airborne infection isolation rooms for airborne diseases such as measles is an example of engineering controls. Administrative controls, such as symptom screening of visitors, patients, and HCP, can be challenging to maintain over time. Use of personal protective equipment (PPE), although highly effective when used correctly and consistently, requires effort by HCP to achieve protection. (Adapted from The National Institute for Occupational Safety and Health (NIOSH). Hierarchy of Controls. Available at: <https://www.cdc.gov/niosh/topics/hierarchy/default.html>. 2015. Accessed November 20, 2020.)

and gowns when caring for patients with potentially communicable diseases, based on the mode of transmission (**Box 1**).<sup>15</sup> Prevention of clinical laboratory-acquired infection requires adherence to recommended administrative protocols (eg, no eating, drinking, or smoking in areas where microbiologic or pathologic samples are processed), engineering controls (eg, containment hoods), personal protective equipment (eg, N-95 respirators when culturing *Mycobacterium tuberculosis*), and appropriate immunizations.<sup>24,25</sup>

## DEFINITIONS

The following definitions are from the Centers for Disease Control and Prevention (CDC).<sup>7</sup>

HCP refers to all paid and unpaid persons serving in health care settings who have the potential for direct or indirect exposure to patients or infectious materials, including body substances; contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air. These HCP may include, but are not limited to, those listed in **Box 2**. In general, HCP who have regular or frequent contact with patients, body fluids, or specimens have a higher risk of acquiring or transmitting infections than do HCP who have only brief contact with patients and their environment (eg, beds, food trays, medical equipment). However, all HCP who work within the confines of a health care facility should be covered by the occupational health service (OHS) and receive appropriate screening and preexposure prophylaxis even if they do not provide direct patient care. Recommendations for HCP who work in dental health care settings, autopsy personnel, and clinical laboratory personnel are addressed elsewhere.<sup>25–27</sup>

Health care settings refer to locations where health care is delivered and includes, but is not limited to, acute care facilities, long-term acute care facilities, inpatient rehabilitation services, nursing homes and assisted living facilities, home health care, vehicles where care is delivered (eg, mobile clinics), and outpatient facilities such as dialysis centers and physician offices.

OHS refers to the group, department, or program that addresses many aspects of health and safety in the workplace for HCP, including the provision of clinical services for work-related injuries, exposures, and illnesses. In health care settings, OHS

<b>Box 1</b>				
<b>Modes of transmission of selected communicable diseases</b>				
<b>Airborne</b>	<b>Bites</b>	<b>Blood Borne</b>	<b>Contact (Direct and Indirect)</b>	<b>Droplet</b>
<ul style="list-style-type: none"> <li>• Measles</li> <li>• Tuberculosis (pulmonary, laryngeal)</li> <li>• Varicella zoster virus (primary varicella or disseminated herpes zoster)</li> </ul>	<ul style="list-style-type: none"> <li>• Rabies</li> <li>• Tetanus</li> </ul>	<ul style="list-style-type: none"> <li>• HBV</li> <li>• HCV</li> <li>• HIV</li> </ul>	<ul style="list-style-type: none"> <li>• Anthrax (cutaneous)</li> <li>• <i>C difficile</i></li> <li>• Hepatitis A</li> <li>• MRSA</li> <li>• SARS-CoV-2</li> <li>• Varicella zoster virus (herpes zoster)</li> <li>• Herpes simplex</li> </ul>	<ul style="list-style-type: none"> <li>• Diphtheria</li> <li>• Influenza</li> <li>• Invasive group A streptococcus</li> <li>• Invasive <i>Neisseria meningitidis</i></li> <li>• Pertussis</li> <li>• Plague</li> <li>• SARS-CoV-2</li> </ul>

*Abbreviations:* MRSA, methicillin-resistant *Staphylococcus aureus*; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2.

**Box 2****Health care personnel whose care should be covered by an occupational health service**

- Emergency medical service personnel
- Nurse and nursing assistants
- Physicians
- Technicians
- Therapists (eg, occupational health, physical, respiratory care)
- Phlebotomists
- Pharmacists
- Students and trainees
- Contractual staff not employed by the health care facility
- Persons not directly involved in patient care (for example, clerical, dietary, housekeeping, laundry, security, maintenance, engineering and facilities management, administrative, billing, volunteers, clinical laboratory personnel)

Note: HCP does not include dental health care personnel, autopsy personnel, and laboratory personnel, for whom recommendations are provided separately.<sup>25-27</sup>

addresses workplace hazards, including communicable diseases; slips, trips, and falls; patient handling injuries; chemical exposures; HCP burnout; and workplace violence. Most commonly, OHS are provided on site within the health care facility in which HCP are performing patient care but may also be provided off site. Occupational health programs should include a variety of activities designed to minimize the risk for HCP to acquire an infectious disease, to evaluate HCP with a potential exposure to a communicable disease, and to evaluate HCP with a communicable disease (**Box 3**).

Occupational health programs should be aware of appropriate guidelines from the CDC and professional organizations. They should adhere to appropriate state and federal laws and regulations. Specific regulations promulgated by the US Occupational Safety and Health Administration (OSHA) related to HCP include BBP (1910.1030)<sup>28</sup> and tuberculosis/respiratory protection (1910.134).<sup>29</sup> The Federal Needlestick Safety and Prevention Act (HR5178), which was enacted in 2000, requires the use of safety engineered devices whenever possible to reduce the likelihood of sharp injuries.<sup>30</sup> Commonly used references are provided in **Table 1**.

## EVALUATION OF HEALTH CARE PERSONNEL AND PREEXPOSURE PROPHYLAXIS

OHS either provide or refer newly hired HCP for preplacement medical evaluations before initiation of employment, and periodically as needed during the course of employment.

### *Preexposure Screening*

All HCP should undergo a new personnel orientation on hire. As part of the orientation process, HCP should undergo screening and education directed at reducing the risk of acquisition of infection diseases by health care providers (**Box 2**). All information obtained should be entered into an electronic database. Access to this database may be prescribed by state law because some states treat HCP occupational health records as personnel records. If OHS records are part of the organization's standard patient

<b>Box 3</b>	
<b>Components of an occupational health service for health care personnel at initial employment</b>	
At initial employment	<ol style="list-style-type: none"> <li>1. Evaluation for ability to perform job functions</li> <li>2. Screen for illicit drugs</li> <li>3. Medical evaluation of selected HCP               <ol style="list-style-type: none"> <li>a. Department of transportation (required for use of certain motor vehicles)</li> <li>b. Flight physical (required of pilots)</li> <li>c. Police/security for use of weapons</li> </ol> </li> <li>4. Review of immunity to vaccine-preventable diseases (<b>Tables 1 and 2</b>)</li> <li>5. Evaluation for tuberculosis               <ol style="list-style-type: none"> <li>a. Symptom review for active tuberculosis</li> <li>b. Testing for latent tuberculosis (TST or IGRA; IGRA preferred)</li> </ol> </li> <li>6. Allergy screening for common health care-associated products               <ol style="list-style-type: none"> <li>a. Latex/natural rubber, germicides (antiseptics, disinfectants)</li> </ol> </li> <li>7. Counseling for pregnant or immunocompromised personnel (voluntary)</li> <li>8. Education               <ol style="list-style-type: none"> <li>a. Fire and electrical safety</li> <li>b. Prevention of sharps injury</li> <li>c. Appropriate hand hygiene and proper use of personal protective equipment</li> <li>d. Workplace violence</li> <li>e. Disaster planning: weather, bomb threats, biothreats, chemical spills</li> <li>f. Reporting infectious disease exposures, injuries, illnesses</li> <li>g. OSHA required (if applicable): blood-borne pathogens, tuberculosis/respiratory protection</li> </ol> </li> </ol>
Annual	<ol style="list-style-type: none"> <li>1. Symptom evaluation for tuberculosis</li> <li>2. Review of immunity to vaccine-preventable diseases               <ol style="list-style-type: none"> <li>a. Influenza immunization</li> </ol> </li> </ol>
Miscellaneous	<ol style="list-style-type: none"> <li>1. Hearing evaluation if part of OSHA-required hearing conservation program</li> <li>2. Test for color blindness if performing high-level disinfection</li> </ol>
Education	<ol style="list-style-type: none"> <li>1. OSHA required (if applicable): blood-borne pathogens, tuberculosis/respiratory protection</li> <li>2. Others as recommended/required by health care facility</li> </ol>
When needed	<ol style="list-style-type: none"> <li>1. Evaluation for possible communicable disease               <ol style="list-style-type: none"> <li>a. Consideration for treatment and job restriction/furlough if disease poses threat to patients or other HCP</li> </ol> </li> <li>2. Evaluation for postexposure prophylaxis               <ol style="list-style-type: none"> <li>a. Consideration for treatment and job restriction/furlough if disease poses threat to patients or other HCP</li> </ol> </li> <li>3. Evaluation of injured personnel (eg, strains, sprains, lacerations)               <ol style="list-style-type: none"> <li>a. Provide first aid</li> <li>b. Refer to emergency department or specialized clinic for severe injuries</li> <li>c. Provide long-term care</li> <li>d. Communicate with worker's compensation department</li> </ol> </li> <li>4. Return-to-work evaluation for non-work-related injuries/illnesses</li> <li>5. Fit-for-duty examination (may include drug and alcohol testing)</li> </ol>
<p><i>Abbreviations:</i> IGRA, interferon gamma release assay; OSHA, Occupational Safety and Health Administration; TST, tuberculin skin test.</p>	

electronic medical records, unauthorized access of provider's occupational health information by supervisors should be prohibited by the institutions privacy rules and periodically assessed.

**Table 1**  
**Commonly cited references related to health care personnel occupational exposure**

<b>Author</b>	<b>Title</b>	<b>Most Recently Updated</b>	<b>Link</b>
CDC, National Center for Emerging and Zoonotic Infectious Diseases, Division of Healthcare Quality and Promotion	Infection Control in Healthcare Personnel: Infrastructure and Routine Practices for Occupational Infection Prevention and Control Services	2019	<a href="https://www.cdc.gov/infectioncontrol/guidelines/healthcare-personnel/index.html">https://www.cdc.gov/infectioncontrol/guidelines/healthcare-personnel/index.html</a>
CDC	Recommended Vaccines for Healthcare Workers	2020	<a href="https://www.cdc.gov/vaccines/adults/rec-vac/hcw.html">https://www.cdc.gov/vaccines/adults/rec-vac/hcw.html</a>
ACIP	ACIP Vaccine Recommendations and Guidelines	2020	<a href="https://www.cdc.gov/vaccines/hcp/acip-recs/index.html">https://www.cdc.gov/vaccines/hcp/acip-recs/index.html</a>
Society for Healthcare Epidemiology of America	Management of Healthcare Personnel Living With Hepatitis B, Hepatitis C, or Human Immunodeficiency Virus in US Healthcare Institutions	2020	<a href="http://www.shea-online.org/index.php/practice-resources">http://www.shea-online.org/index.php/practice-resources</a>

*Abbreviation:* ACIP, Advisory Committee on Immunization Practices.

## Immunizations

General recommendations regarding vaccination of HCP have been published by the CDC, the Advisory Committee on Immunization Practices (ACIP) for HCP<sup>11,31</sup> as well as the general public<sup>32</sup> and adults,<sup>33</sup> and the American Academy of Pediatrics (AAP) for children.<sup>34</sup> The most recent ACIP recommendations for adults, which are summarized yearly, should always be consulted. It is recommended that all HCP be immune to mumps, measles, rubella, varicella, influenza, and, in the context of the coronavirus disease 2019 (COVID-19) pandemic, severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).<sup>35</sup> Depending on the vaccine-preventable disease, immunity may be ensured by several different measures (Table 2). HCP who are not immune should receive appropriate immunizations (Table 3). However, even if HCP are considered immune to a vaccine-preventable disease transmitted by the droplet (ie, pertussis, invasive meningococcal infection, mumps, rubella, SARS-CoV-2) or airborne (ie, varicella, measles) route, they should wear appropriate respiratory protection as per transmission-based precautions while providing care to a patient with confirmed or suspected disease because immunization is not 100% effective in preventing infection. Further, failure of any provider to wear the appropriate respiratory protection may lead nonimmune providers (eg, persons with a contraindication to vaccination) to mistakenly believe that the transmission-based precautions have been discontinued.

HCP should be provided with all vaccines that are recommended for adults,<sup>33</sup> such as human papillomavirus, herpes zoster, Tdap (tetanus toxoid, diphtheria toxoid, acellular pertussis), and pneumococcal vaccines, or referred to their local medical providers for the same. In special circumstances, HCP should be offered immunization

Vaccine	Birth Before 1957	Physician Diagnosis	Positive Serology	Self-Report	Documented Appropriate Vaccine Series <sup>a</sup>
Mumps (MMR)	Yes <sup>b</sup>	Yes <sup>d</sup>	Yes	No	Yes
Measles (MMR)	Yes <sup>b</sup>	Yes <sup>c</sup>	Yes	No	Yes
Rubella (MMR)	Yes <sup>b,c</sup>	No	Yes	No	Yes
Varicella	No	Yes	Yes	Yes <sup>e</sup>	Yes
Hepatitis B	No	—	>10 mIU/mL <sup>f</sup>	No	Yes
Influenza	No	No	No	No	Yes
SARS-CoV-2	No	No	No	No	Yes

“Yes” in any column is acceptable evidence of immunity.

Greater than 96% of HCP born before 1957 were shown to be immune to measles, mumps, and/or rubella.<sup>37</sup>

*Abbreviation:* MMR, measles, mumps, rubella.

<sup>a</sup> Written documentation (ie, signed by a health care provider).

<sup>b</sup> Consider immunization of HCP born before 1957; recommend during an outbreak.

<sup>c</sup> All HCP of child-bearing potential should be immunized.

<sup>d</sup> Requires laboratory confirmation of infection.

<sup>e</sup> Based on published literature: greater than 97% of HCP born before 1980 were shown to be immune to varicella in 2014.<sup>36</sup>

<sup>f</sup> Obtain anti-hepatitis B surface antibody (anti-HBs) titer, 1 to 2 months after the last vaccine dose; if immunization is remote and anti-HBs titer not available, see text for management.



<b>Table 3 Immunizations recommended for nonimmune health care personnel</b>		
<b>Vaccine</b>	<b>Health Care Personnel</b>	<b>Comments</b>
Mumps	All (2 doses)	Provide as MMR
Measles	All (2 doses)	Provide as MMR
Rubella	All (1 dose)	Provide as MMR
Varicella	All (2 doses)	—
Hepatitis B	HCP with potential exposure to blood or contaminated body fluids (2 or 3 doses depending on vaccine)	—
Meningococcal (serogroups A, C, Y, W)	Clinical microbiologists (1 dose; booster every 5 y)	All vaccines available are now conjugate products
Meningococcal (serogroup B)	Clinical microbiologists (2 or 3 doses, depending on manufacturer); booster every 2–3 y	MenB-FHbp and MenB-4C are not interchangeable
Influenza	All (1 dose each year)	HCP who care for severely immunocompromised persons who require care in a protected environment should receive IIV or RIV; HCP who receive LAIV should avoid providing care for severely immunocompromised persons (ie, persons receiving care in protected hospital unit such as BMTU) for 7 d after immunization
SARS-CoV-2	All (frequency of immunization not yet established)	

*Abbreviations:* BMTU, bone marrow transplant unit; IIV, inactivated influenza vaccine; LAIV, live, attenuated influenza vaccine; RIV, recombinant influenza vaccine.

*Data from Refs* <sup>31,35</sup> *and ACIP.*

with other vaccines, including polio, rabies, hepatitis A, vaccinia (smallpox),<sup>38</sup> Ebola virus, and anthrax (**Box 4**). HCP responding to an outbreak of Ebola virus disease (EVD), who work in one of the federally designated Ebola treatment centers in the United States, or work as laboratorians or other staff at biosafety level 4 facilities in the United States, are recommended for vaccination with EVD.<sup>39</sup> In addition, HCP who are traveling outside the United States for work-related activities should be evaluated and provided with CDC-recommended immunizations such as typhoid, cholera, and Japanese encephalitis.<sup>40,41</sup>

Vaccination for SARS-CoV-2 is recommended for HCP, including paid and unpaid personnel working in all health care settings. At this time, 2 vaccines, both messenger RNA (mRNA) vaccines, have been approved under Emergency Use Authorization: Pfizer-BioNTech's COVID-19 vaccine and Moderna's COVID-19 vaccine. Late-stage trials of additional vaccines are underway or planned (AstraZeneca, Janssen, and Novavax). There are few contraindications to vaccination. These contraindications include (1) severe allergic reaction (eg, anaphylaxis) after a previous dose of an mRNA COVID-19 vaccine or any of its components, (2) immediate allergic reaction of any severity to a previous dose of an mRNA COVID-19 vaccine or any of its components (including polyethylene glycol [PEG]), and (3) immediate allergic reaction of any severity to polysorbate (because of potential cross-reactive hypersensitivity with the vaccine ingredient PEG). Individuals in the last 2 categories should not receive mRNA COVID-19 vaccination unless they have been evaluated by an allergist-

#### Box 4

##### Special-use vaccines<sup>a</sup>

1. Anthrax: PEP, research, biothreat attack
2. Diphtheria (Tdap): outbreak
3. Ebola virus (Ervebo): adults who are responding, or may respond, to an outbreak of EVD, laboratorians or other staff working at biosafety level-4 facilities in the United States, or HCP working at federally designated Ebola treatment centers in the United States
4. Hepatitis A: PEP, outbreak, travel
5. Hepatitis B: PEP, travel
6. Measles (MMR): PEP, outbreak
7. Meningococcal serotypes A, C, W, Y: outbreak, travel
8. Meningococcal serotype B: outbreak
9. Mumps (MMR): outbreak
10. Pertussis (Tdap): outbreak
11. Poliomyelitis: research, outbreak
12. Rabies: PEP, research, travel
13. Rubella (MMR): outbreak
14. Smallpox (vaccinia): PEP, research, biothreat attack
15. Tetanus (Tdap or Td): PEP
16. Varicella: PEP, outbreak

*Abbreviation:* Td, tetanus toxoid, diphtheria toxoid.<sup>a</sup>Additional vaccines may be recommended for researchers or travel, such as yellow fever, Japanese encephalitis, and cholera.

immunologist who has determined that the vaccine can be safely administered with adequate observation and support. Detailed guidance is provided by the CDC. Individuals with a history of immediate allergic reaction to any other vaccine or injectable therapy can receive mRNA COVID-19 vaccines but must have received counseling in advance regarding potential risk of severe allergic reaction. If vaccination proceeds in these instances, the observation period should be extended from 15 minutes to 30 minutes for individuals with a history of immediate allergic reaction of any severity to a vaccine or injectable therapy and persons with a history of anaphylaxis of any cause.<sup>42</sup> Vaccination centers should have immediate availability of resuscitation equipment.

### ***Immunocompromised Health Care Personnel***

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Immunocompromised HCP require special consideration in the provision of immunizations.<sup>32</sup> First, live, attenuated virus vaccines (eg, measles-mumps-rubella; varicella; live, attenuated influenza) may be contraindicated. Second, vaccines not routinely recommended may be indicated (eg, pneumococcal, meningococcal, *Haemophilus influenzae* type b). Third, higher antigen doses (eg, hepatitis B vaccine in people with end-stage renal disease), additional doses of vaccine (eg, rabies vaccine in immunocompromised persons), or postimmunization serologic evaluation may be indicated (eg, antibody response to rabies vaccine) because immunization of immunocompromised people may elicit a lower antibody response. In addition, such personnel should be individually evaluated for reassignment (with the consent of the employee) depending on their job duties. Of importance, caring for an immunocompromised patient is not a contraindication to receipt of a live, attenuated vaccine, although HCP receiving live, attenuated influenza vaccine (LAIV) should not work in a protected environment (ie, stem cell transplant unit) for 7 days postimmunization.<sup>33,43</sup>

### ***Pregnant Health Care Personnel***

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Pregnant HCP also require special consideration in the provision of immunizations. The risks from immunization during pregnancy are largely theoretic.<sup>32</sup> The benefit of immunization among pregnant women usually outweighs the potential risks for adverse reactions, especially when the risk for disease exposure is high, infection would pose a special risk to the mother or fetus, and the vaccine is unlikely to cause harm.<sup>44–47</sup> Furthermore, newer information continues to confirm the safety of vaccines given inadvertently during pregnancy. Ideally, women of childbearing age, including HCP, should have been immunized against measles, mumps, rubella, varicella, tetanus, diphtheria, pertussis, meningococcus, polio, COVID-19, hepatitis A, and hepatitis B as children or adolescents before becoming pregnant. Nevertheless, live, attenuated vaccines should be provided only to nonpregnant HCP and deferred during pregnancy. The ACIP has recommended administration of Tdap during all pregnancies, preferably during weeks 27 to 36. If not administered during pregnancy, Tdap should be administered immediately postpartum before discharge from the hospital or birthing center for new mothers who have never received Tdap before or whose vaccination status is unknown. Women who are pregnant during respiratory virus season should receive inactivated influenza immunization. There is no convincing evidence of risk from immunizing pregnant women with other inactivated virus or bacterial vaccines, or toxoids. Susceptible pregnant women at high risk for specific infections should receive, as indicated, the following vaccines: hepatitis A, hepatitis B, pneumococcal polysaccharide, meningococcal, rabies, COVID-19, and poliovirus (inactivated) (see **Box 3**). Importantly, the indications for use of immunoglobulin preparations are the same in pregnant and nonpregnant women. Breastfeeding does not

adversely affect the response to immunization and is not a contraindication for any of the currently routinely recommended routine vaccines.

### ***Health Care Personnel with Contraindications or Precautions to Immunization***

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Before the administration of any vaccine, the HCP should be evaluated for the presence of conditions that are listed as a vaccine contraindication or precaution.<sup>32</sup> If such a condition is present, the risks and benefits of vaccination need to be carefully weighed by the health care provider and the patient. The most common contraindication is a history of an anaphylactic reaction to a previous dose of the vaccine or to a vaccine component. Factors that are not contraindications to immunization include the following: household contact with a pregnant woman; breastfeeding; reaction to a previous vaccination, consisting only of mild to moderate local tenderness, swelling, or both, or fever less than 40.5°C; mild acute illness with or without low-grade fever; current antimicrobial therapy (except for oral typhoid vaccine) or convalescence from a recent illness; personal history of allergies, except a history of an anaphylactic reaction to a vaccine component; and family history of allergies, serious adverse reactions to vaccination, or seizures.

### ***Routine Immunization as a Condition of Employment***

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Despite the benefits of vaccination, challenges remain in ensuring a fully vaccinated health care workforce. In February 2012, the National Vaccine Advisory Committee issued a statement that provided recommendations on how to achieve the Healthy People 2020 annual influenza vaccine coverage goal (ie, 90%) for HCP; for facilities that have implemented the recommended initial strategies but have “not consistently achieved the Healthy People goal for vaccination coverage of HCP in an efficient and timely manner” it was recommended that they should “strongly consider an employer requirement for influenza immunization.”<sup>48</sup> In the most recent season for which data are available, 80.6% of HCP reported receiving influenza vaccination during the 2019 to 2020 season. Among those who were required by their employer to receive the vaccination, compliance was higher at 94.4% compared with those without an employer mandate at 69.6%.<sup>49</sup> In 2020, the Society for Healthcare Epidemiology of America (SHEA) recommended that only medical contraindications should be accepted as a reason for not receiving all routine immunizations as recommended by the CDC.<sup>50</sup>

## **EVALUATION OF HEALTH CARE PERSONNEL WITH COMMUNICABLE DISEASES**

HCP exposed to a communicable disease for which they are susceptible should be considered for work restrictions or furlough. Similarly, HCP ill with a communicable disease should be considered for work restrictions or furlough (**Table 4**). Importantly, infectious HCP have been the source for patient infection and the index case for outbreaks.<sup>52,53</sup> HCP-to-patient transmission has been well documented for HIV, HBV, and HCV, but has most commonly been reported with HBV. For this reason, infected HCP who perform invasive procedures should be evaluated by a special panel for the need for education, additional engineering controls, and/or work restrictions per current guidelines from the Society of Hospital Epidemiology of America<sup>54</sup> and CDC.<sup>55</sup>

## **SUMMARY**

Although HCP are at risk of exposure to communicable diseases, effective occupational health programs can mitigate risk through thorough evaluation of HCP, ensuring appropriate preexposure prophylaxis, and management of HCP with communicable diseases.

Table 4

## Recommended work restrictions for health care personnel colonized/exposed or infected with selected infectious agents

Infection or Infectious Agent	Exposed or Colonized	Infected (Duration of Restrictions)
Conjunctivitis (adenovirus)	Exposed; no restriction unless illness develops	Restrict from patient contact and contact with the patient's environment (until discharge ceases)
Cytomegalovirus	No restriction	No restriction
Diarrheal diseases	No restriction unless illness develops	Acute disease: exclude from duty (until >48–72 h after symptoms resolve) Convalescent stage ( <i>Salmonella</i> spp): restrict from care of high-risk patients and food handling (until symptoms resolve; consult local and state authorities for HCP/food handlers with <i>Salmonella typhi</i> )
Diphtheria	Exposed: no restriction unless illness develops	Exclude from duty (until antimicrobial therapy completed and 2 cultures obtained $\geq 24$ h apart are negative)
Hepatitis A	Exposed: no restriction unless illness develops	Restrict from patient contact, contact with patient's environment, and food handling (until 7 d after onset of jaundice)
Hepatitis B (chronic)	—	Restrictions based on review of only HCP who perform exposure-prone procedures by expert panel (see text)
Hepatitis C	—	Restrictions based on review of HCP who perform exposure-prone procedures by expert panel (see text)
Herpes simplex (genital)	—	No restriction
Herpes simplex (hands; herpetic whitlow)	—	Restrict from patient contact and contact with the patient's environment (until lesions heal)

Herpes simplex (orofacial)	—	Evaluate for need to restrict from care of high-risk patients
HIV	—	Restrictions based on review of HCP who perform exposure-prone procedures by expert panel (see text)
Measles	Exposed (susceptible HCP): exclude from duty (from the fifth day after first exposure through 21st day after last exposure and/or after rash appears)	Exclude from duty (until 4 d after the rash appears)
Meningococcal infections	Exposed: no restriction unless illness develops Colonized (unrelated to invasive case): no restriction	Exclude from duty (until 24 h after start of effective therapy)
Methicillin-resistant <i>Staphylococcus aureus</i>	Colonized: no restrictions unless or ill or epidemiologically/molecular test linked to patient infections	Allow to work provided lesions can be contained under a bandage and clothes; if lesions on exposed area (eg, hand/wrists, face/neck), exclude from duty (until lesions healed)
Mumps	Exposed (susceptible HCP): exclude from duty (from the 12th day after first exposure through 26th day after last exposure or after onset of parotitis)	Exclude from duty (until 9 d after onset of parotitis)
Pertussis	Exposure (asymptomatic): no restriction unless develops illness (PEP recommended) Exposed (symptomatic): per active disease	Exclude from duty (from beginning of catarrhal stage through third week after onset of paroxysms or until 5 d after start of effective antimicrobial therapy)
Rubella	Exposed (susceptible HCP): exclude from duty (from seventh day after first exposure through 21st day after last exposure)	Exclude from duty (until 5 d after rash appears)
Group A <i>Streptococcus</i>	Colonized: no restrictions unless or ill or epidemiologically/molecular test linked to patient infections	Restrict from patient care, contact with patient's environment, or food handling

(continued on next page)

<b>Table 4 (continued)</b>		
<b>Infection or Infectious Agent</b>	<b>Exposed or Colonized</b>	<b>Infected (Duration of Restrictions)</b>
		(until 24 h after adequate treatment started)
Tuberculosis	Latent tuberculous infection: no restrictions	Active pulmonary tuberculosis; exclude from duty (until proved noninfectious)
Varicella	Exposed (susceptible): exclude from duty from 10th day after first exposure through 21st day (27th day if varicella immune globulin provided) after last exposure	Exclude from duty (until all lesions dried and crusted)
Zoster	Exposed (susceptible): same as varicella	Localized, in healthy HCP: allow to work provided lesions can be contained under a bandage and clothes; if lesions on exposed area (eg, hand/wrists, face/neck), exclude from duty (until lesions dried and crusted) Generalized or localized in immunosuppressed HCP: exclude from duty (until all lesions dried and crusted)
Viral respiratory tract infections (acute)	No restrictions unless illness develops <sup>a</sup>	Febrile: exclude from duty (until afebrile for >24 h) Afebrile: exclude from care of highly immunocompromised patients (ie, patients cared for in a protected environment) until afebrile for >24 h or 7 d since onset of symptoms, whichever is longer; HCP should wear a mask providing care until symptom free
SARS-CoV-2	Detailed recommendations related to HCP restrictions after exposure to SARS-CoV-2 are available	

<sup>a</sup> Consider restrictions if HCP exposed to highly contagious disease transmitted by the respiratory route or close contact (eg, MERS-CoV [Middle East respiratory syndrome coronavirus], Ebola).<sup>1</sup>

Data from Refs. <sup>6,7,51</sup>

## CLINICS CARE POINTS

- On hire, HCP should undergo screening and education directed at reducing the risk of acquisition of infection diseases by health care providers.
- Recommendations for immunization for HCP are provided by CDC and ACIP.
- Before the administration of any vaccine, the HCP should be evaluated for the presence of conditions that are listed as a vaccine contraindication or precaution.

## DISCLOSURE

The authors have nothing to disclose.

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