Executive Summary

This document, *Infection Control in Healthcare Personnel: Epidemiology and Control of Selected Infections Transmitted Among Healthcare Personnel and Patients*, supersedes updated sections of *Guideline for infection control in health care personnel, 1998* ("*1998 Guideline*"), *Part E: Epidemiology and Control of Selected Infections Transmitted Among Health Care Personnel and Patients*, and their corresponding recommendations in Part II of the *1998 Guideline.* Additional updated sections are forthcoming.

This update is intended for use by the leaders and staff of Occupational Health Services (OHS) and to guide OHS in the management of exposed or infected healthcare personnel (HCP) who may be contagious to others in the workplace. The updated recommendations in these sections focus on postexposure management, including postexposure prophylaxis (PEP), for exposed HCP and work restrictions for exposed or infected HCP.

The recommendations in this document update the 1998 recommendations with current guidance on the management of exposed or potentially infectious HCP. New topics in the update include expanded information regarding defining occupational exposures in healthcare settings, and descriptions of clinical features of each disease. Links are provided to current resources for diagnostic testing and recommended vaccines and criteria for evidence of immunity to vaccine-preventable diseases for HCP.

The recommendations are informed by reviews of the *1998 Guideline*; current CDC resources, guidance, and guidelines; and new resources and evidence, when available. The recommendations are classified as good practice statements based upon the expert opinions of the authors and the Healthcare Infection Control Practices Advisory Committee (HICPAC).

Introduction

Scope and Purpose

The prevention of infectious disease transmission among healthcare personnel (HCP) and patients is a critical component of safe healthcare delivery in all healthcare settings. Occupational Health Services (OHS) provides occupational infection prevention and control (IPC) expertise to a healthcare organization (HCO) and services to HCP, such as those aimed at reducing risks for acquiring infections on the job (e.g., immunizing HCP) and managing HCP infectious exposures and illnesses that prevent the transmission of infectious diseases from potentially infectious HCP to patients, HCP, and others.

In 1998, the Centers for Disease Control and Prevention (CDC) published *Guideline for infection control in health care personnel, 1998*[1] (*"1998 Guideline"*), which provided information and recommendations for OHS on the prevention of transmission of infectious diseases among HCP and patients. This update, *Infection Control in Healthcare Personnel: Epidemiology and Control of Selected Infections Transmitted Among Healthcare Personnel and Patients*, supersedes updated sections of the *1998 Guideline, Part E: Epidemiology and Control of Selected Infections Transmitted Among Health Care Personnel and Patients*, and their corresponding recommendations in Part II of the *1998 Guideline.*

Additional updated sections are forthcoming.

HCP may be exposed to contagious infectious diseases in the community or in the workplace. Only those infectious diseases that may be transmitted in healthcare settings are addressed in the update.

The updated recommendations are intended to guide OHS in the management of exposed or infected HCP who may be contagious to others in the workplace. The updated recommendations in these sections focus on postexposure management, including postexposure prophylaxis (PEP), for exposed HCP and work restrictions for exposed or infected HCP. Each section describes occupational exposures; clinical features of disease, such as the incubation period and clinical signs and symptoms; and disease testing and diagnosis.

This update does not address non-infectious elements of occupational health, such as slips, trips and falls; patient handling injuries; chemical exposures; HCP burnout; and workplace violence. This update does not provide recommendations about other aspects of IPC such as environmental infection control and isolation precautions for patients. Readers are referred to Advisory Committee on Immunization Practices (ACIP) resources for recommendations related to HCP immunization. Further, this update does not address emerging pathogens, clinical treatment, or outbreak management, nor does it describe all federal, state, and local requirements related to occupational IPC, such as those maintained by the Occupational Safety and Health Administration (OSHA).

Rationale

This update is intended to:

- provide current infection-specific guidance on the management of exposed or potentially infectious HCP, and
- prevent the transmission of infectious diseases among HCP and patients.

Immunodeficiencies that may affect occupational infection prevention and control include primary (i.e., congenital) and secondary (i.e., acquired). Examples of primary immunodeficiencies include X-linked agammaglobulinemia and chronic granulomatous disease. Secondary immunodeficiencies are more common in HCP, and examples include immunodeficiency due to hematopoietic malignancies and treatment of conditions (e.g., solid organ transplantation, rheumatoid arthritis) with immunosuppressive drugs such as prednisone, monoclonal antibodies, and immunomodulatory agents. Often, data are limited to inform which immunodeficiencies should affect implementation of occupational IPC.

Some conditions, such as combined primary immunodeficiency syndromes, being on chemotherapy for cancer, untreated HIV infection with CD4 T lymphocyte count <200cells/mm^3, and receipt of prednisone >20mg/day for more than 14 days, may cause a higher degree of immunocompromise and require actions such as lengthening the duration of HCP work restrictions for some infections to prevent transmission to from HCP to others. Other factors, such as advanced age, diabetes mellitus, or end-stage renal disease, may pose a much lower degree of immunocompromise and not clearly affect OHS actions to prevent disease transmission.[9] Ultimately, the degree of immunocompromise for HCP is determined by the treating provider, and preventive actions are tailored to each individual and situation.

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Diphtheria

Recommendations

1. For healthcare personnel who have an exposure to diphtheria, regardless of vaccination status:
    - Administer postexposure prophylaxis in accordance with CDC recommendations.
    - Exclude from work and obtain nasal and pharyngeal swabs for diphtheria culture.
        - If nasal AND pharyngeal cultures are negative for toxin-producing *C. diphtheriae*, healthcare personnel may return to work while completing postexposure antibiotic therapy.
        - If nasal OR pharyngeal cultures are positive for toxin-producing *C. diphtheriae*:
            - Complete postexposure antibiotic therapy.
            - Healthcare personnel may return to work when:
                - Postexposure antibiotic therapy is completed AND
                - At least 24 hours after completion of postexposure antibiotic therapy, two consecutive pairs of nasal AND pharyngeal cultures, obtained at least 24 hours apart, are negative for toxin-producing *C. diphtheriae*.
    - Implement daily monitoring for the development of signs and symptoms of diphtheria for 7 days after the last exposure.
2. For healthcare personnel with respiratory diphtheria infection, exclude from work until:
    - Antibiotic and antitoxin (if needed) therapy are completed AND
    - At least 24 hours after completion of antibiotic therapy, two consecutive pairs of nasal AND pharyngeal cultures, obtained at least 24 hours apart, are negative for toxin-producing *C. diphtheriae*.
3. For healthcare personnel with cutaneous diphtheria infection or other diphtheria infection manifestations, determine the duration of exclusion from work in consultation with federal, state, and local public health authorities.

Narrative

Background

Healthcare-associated transmission of diphtheria has been reported, although diphtheria is uncommon in the United States.[1-5] Diphtheria remains endemic in many parts of the developing world, and ongoing circulation of toxigenic *Corynebacterium diphtheriae* (*C. diphtheriae*) strains has been reported in North America.[2,6,7] Healthcare personnel (HCP) are not at substantially higher risk than the general adult population for acquiring diphtheria; however, there is the potential for sporadic or imported cases to require medical care in the United States. Some cases in the United States have been related to importation.[2,6,8,9]

Prevention of transmission of *C. diphtheriae* in healthcare settings involves:

a. encouraging vaccination of HCP against diphtheria in compliance with routine adult vaccine schedules[10,11];
b. in addition to using Standard Precautions, placing patients with known or suspected respiratory diphtheria on Droplet Precautions and placing patients with known or suspected cutaneous diphtheria on Contact Precautions[12];

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Group A *Streptococcus*

Recommendations

1. Postexposure prophylaxis and work restrictions are not necessary for healthcare personnel who have an exposure to group A *Streptococcus*.
2. For healthcare personnel with known or suspected group A *Streptococcus* infection, obtain a sample from the infected site, if possible, for group A *Streptococcus* and exclude from work until group A *Streptococcus* infection is ruled out, or until 24 hours after the start of effective antimicrobial therapy, provided that any draining skin lesions can be adequately contained and covered.
    - For draining skin lesions that cannot be adequately contained or covered (e.g., on the face, neck, hands, wrists), exclude from work until the lesions are no longer draining.
3. Work restrictions are not necessary for healthcare personnel with known or suspected group A *Streptococcus* colonization, unless they are epidemiologically linked to transmission of the organism in the healthcare setting.
4. For healthcare personnel with group A *Streptococcus* colonization who are epidemiologically linked to transmission of the organism in the healthcare setting:
    - Administer chemoprophylaxis in accordance with CDC recommendations AND
    - Exclude from work until 24 hours after the start of effective antimicrobial therapy AND
    - Obtain a sample from the affected site for group A *Streptococcus* testing 7 to 10 days after completion of chemoprophylaxis; if positive, repeat administration of chemoprophylaxis and again exclude from work until 24 hours after the start of effective antimicrobial therapy.

Narrative

Background

Group A *Streptococcus* (GAS) is a bacterium that can cause many different infections, including strep throat, scarlet fever, impetigo, and others. A common cause of pharyngeal, skin, and other soft tissue infections, GAS can also cause severe, life-threatening invasive disease, including pneumonia, streptococcal toxic-shock syndrome (STSS) and necrotizing fasciitis.[1] Healthcare-associated transmission of GAS has been documented from patients to healthcare personnel (HCP) and from HCP to patients.[1-10]

Prevention of transmission of GAS in healthcare settings involves:

a. in addition to using Standard Precautions, placing patients with known or suspected GAS infection in recommended transmission-based precautions according to their clinical manifestations of GAS disease[11];
b. rapidly diagnosing and treating patients with clinical infection; and
c. excluding potentially infectious HCP from work.

Occupational Transmission

There are no recommended actions, such as administering postexposure prophylaxis (PEP) or work restrictions, after HCP exposure to GAS. Contact or dispersal of respiratory secretions are the major modes of transmission of GAS in healthcare settings.

HCP who were GAS carriers have been linked to outbreaks of surgical site, postpartum, and burn wound infections. In these outbreaks, GAS carriage was documented in the pharynx, the skin, the rectum, and the female genital tract of the colonized personnel.[1,9,12-22]

Transmission from patients to HCP has been described, with potential contributing factors including gross contamination of surgical attire during extensive wound debridement, presence of dermatitis, not using gloves when providing wound care, and sharps injury.[2,3,10,23,24]

Although rare, spread of GAS infections may also occur via food. Foodborne outbreaks of pharyngitis have occurred due to improper food handling, and HCP have been linked to foodborne transmission of GAS, causing pharyngitis.[25,26]

Clinical Features

GAS infections can have a wide variety of clinical presentations. GAS pharyngitis is fairly common and characterized by sudden-onset sore throat, pain when swallowing, fever, inflamed tonsils, petechiae on the soft or hard palate, and swollen lymph nodes in the front of the neck.[25] GAS pharyngitis is typically not associated with cough, rhinorrhea, hoarseness, or conjunctivitis – symptoms more frequently associated with viral pharyngitis.[25] Because clinical signs and symptoms of viral pharyngitis can mimic those of GAS pharyngitis, laboratory testing for GAS is necessary to make an accurate GAS pharyngitis diagnosis.[27]

Persons with GAS pharyngitis who are treated with an appropriate antibiotic are generally non-infectious after the first 24 hours of treatment.

In addition, GAS can cause an array of both superficial (e.g., impetigo) and invasive (e.g., cellulitis, abscesses) skin and soft tissue infections. Many invasive GAS infections - such as pneumonia, meningitis, necrotizing fasciitis, and STSS - are associated with high morbidity and mortality rates in the United States.[28] The portal of entry is unknown in most invasive GAS infections, but is presumed to be skin or mucous membranes.[29] Necrotizing fasciitis, a life-threatening condition, can be caused by GAS and is often initially characterized by development of a red or swollen area of skin that spreads quickly; severe pain, including pain beyond what is expected on physical examination; and fever.[30]

Toxin-producing GAS strains can cause STSS that typically manifests as a severe acute systemic illness characterized by fever, hypotension, and signs of multiorgan system failure.[29] STSS can occur without an identifiable focus of infection, although the presence of concomitant local soft tissue infection is common.[29]

The incubation period of GAS pharyngitis is approximately 2 to 5 days.[25] The incubation period is variable for other GAS infections. The incubation period for STSS has been as short as 14 hours when associated with penetrating trauma or other methods resulting in subcutaneous inoculation of organisms.[29]

Testing and Diagnosis

Because the signs and symptoms of GAS pharyngitis are similar to other infections, laboratory testing is necessary to confirm the diagnosis.[25,27] Any Clinical Laboratory Improvement Amendments (CLIA)-approved testing method for GAS pharyngitis may be used to test for infection as well as to confirm eradication of colonization among HCP. Rapid antigen detection tests (RADT) have high specificity for GAS, but varying sensitivities when compared to throat culture, which remains the gold standard diagnostic test.[25,27]

Invasive GAS disease is usually confirmed by isolation of GAS from a normally sterile body site through culture.[14]

Measles

Recommendations

1. For asymptomatic healthcare personnel ***with*** presumptive evidence of immunity to measles (https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm#Tab3)[1] who have an exposure to measles:
    - Postexposure prophylaxis is not necessary.
    - Work restrictions are not necessary.
    - Implement daily monitoring for signs and symptoms of measles from the 5th day after their first exposure through the 21st day after their last exposure.
2. For asymptomatic healthcare personnel ***without*** presumptive evidence of immunity to measles who have an exposure to measles:
    - Administer postexposure prophylaxis in accordance with CDC and ACIP recommendations (https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html).[2]
    - Exclude from work from the 5th day after their first exposure through the 21st day after their last exposure, regardless of receipt of postexposure prophylaxis.
    - Work restrictions are not necessary for healthcare personnel who received the first dose of MMR vaccine prior to exposure:
        - They should receive their second dose of MMR vaccine as soon as possible (at least 28 days after their first dose).
        - Implement daily monitoring for signs and symptoms of measles from the 5th day after their first exposure through the 21st day after their last exposure.
3. For healthcare personnel with known or suspected measles, exclude from work for 4 days after the rash appears.
4. For immunocompromised healthcare personnel with known or suspected measles, exclude from work for the duration of their illness.
5. During a measles outbreak, administer measles vaccine to healthcare personnel in accordance with CDC and ACIP recommendations (https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html).[2]

Narrative

Background

Measles was declared eliminated in the US in 2000; however, community-acquired measles cases have persisted as a result of importation.[3,4] Outbreaks of measles in healthcare settings remain well described, and transmission to and from healthcare personnel (HCP) continues to be reported.[5-8] HCP are considered to be at higher risk for measles acquisition than the general population, as patients with measles often seek medical care due to the severity of their symptoms[5,9]; further, measles is highly contagious and potentially under-recognized, with delays in patient isolation and diagnosis.[7]

Prevention of transmission of measles in healthcare settings involves (a) ensuring HCP have presumptive evidence of immunity; (b) using infection prevention and control practices as recommended by CDC (https://www.cdc.gov/infectioncontrol/guidelines/isolation/appendix/type-duration-precautions.html#M)[10]; and (c) excluding potentially infectious HCP from work.[9,11] The criteria for presumptive evidence of immunity to measles and recommendations for measles vaccination of HCP are maintained by CDC and ACIP (https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html).[2]

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Mumps

Recommendations

1. For asymptomatic healthcare personnel ***with*** presumptive evidence of immunity to mumps (https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm#Tab3)[1] who have an exposure to mumps:
    - Work restrictions are not necessary.
    - Implement daily monitoring for signs and symptoms of mumps from the 10th day after their first exposure through the 25th day after their last exposure.
2. For asymptomatic healthcare personnel ***without*** presumptive evidence of immunity to mumps who have an exposure to mumps:
    - Exclude from work from the 10th day after their first exposure through the 25th day after their last exposure.
    - Work restrictions are not necessary for healthcare personnel who received the first dose of MMR vaccine prior to exposure:
        - They should receive their second dose of the MMR vaccine as soon as possible (at least 28 days after their first dose).
        - Implement daily monitoring for signs and symptoms of mumps infection from the 10th day after their first exposure through the 25th day after their last exposure.
3. For healthcare personnel with known or suspected mumps, exclude from work for 5 days after the onset of parotitis.
4. For healthcare personnel with known or suspected mumps, but without parotitis, exclude from work for 5 days after onset of their first symptom.
5. During a mumps outbreak, administer mumps vaccine to healthcare personnel in accordance with CDC and ACIP recommendations (https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html).[2]

Narrative

Background

Mumps is an acute viral illness caused by a paramyxovirus. Mumps was a common childhood illness prior to the introduction of the mumps vaccine and the implementation of mumps vaccination policies in 1977. Since then, reports of mumps cases in the US declined significantly. Starting in 2006, there has been an increase in the number of mumps cases and outbreaks reported in the United States. Most of the cases have occurred in fully vaccinated adolescents and young adults, mainly driven by outbreaks on college campuses, close-knit communities, and other congregate settings.[3-5] In the post-vaccination era, mumps transmission in healthcare settings among healthcare personnel (HCP) and patients has been reported.[6-10] Although transmission of mumps in healthcare settings is infrequent, it may be under-reported because approximately 20% of infected persons can be asymptomatic. The frequency of asymptomatic infection among vaccinated people is unknown.[3,9,11-15]

Prevention of transmission of the mumps virus in healthcare settings involves (a) ensuring HCP have presumptive evidence of immunity[16]; (b) using infection prevention and control practices as recommended by CDC (https://www.cdc.gov/infectioncontrol/guidelines/isolation/appendix/type-duration-precautions.html#M)[17]; and (c) excluding potentially infectious HCP from work.[3,18,19] The criteria for presumptive evidence of immunity to mumps and recommendations for mumps vaccination of HCP are maintained by CDC and ACIP (https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html).[2]

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Special Populations: Pregnant Healthcare Personnel

Recommendations

1. Do not routinely exclude healthcare personnel only on the basis of their pregnancy or intent to be pregnant from the care of patients with infections that have potential to harm the fetus (e.g., Cytomegalovirus (CMV), Human Immunodeficiency Virus (HIV), viral hepatitis, herpes simplex, parvovirus, rubella, varicella)

For recommendations and additional information about counselling healthcare personnel, including those who are pregnant or intending to become pregnant, please see Section 1, **Medical Evaluations**.

Narrative

Background

Pregnant healthcare personnel (HCP) are temporarily immunocompromised, and occupational acquisition of infections is of special concern to HCP of childbearing age and occupational health services (OHS) for several reasons. In general, pregnant HCP do not have an increased risk for acquiring infections in the workplace, and pregnancy itself does not change HCP risk for exposure to infectious diseases; however, pregnancy may make persons at higher risk for complications of some diseases, such as varicella and the risk for developing pneumonia, and may pose risks to their fetus, such as development of congenital varicella syndrome.[1]

Pregnancy affects the safety of administering some recommended immunizations and may require OHS to wait until pregnancy is over for administration. Live vaccines administered to pregnant HCP pose a theoretical risk to the fetus; therefore, live, attenuated virus and live bacterial vaccines are generally contraindicated during pregnancy. However, all inactivated viral and bacterial vaccines and immunoglobulin preparations [e.g., Hepatitis B Immune Globulin (HBIV), Varicella Zoster Immune Globulin (VARIZIG)] may be administered, if indicated, to pregnant HCP. Further, Tetanus, Diphtheria, Pertussis (Tdap); inactivated influenza; and COVID-19 vaccines are specifically indicated for pregnant persons.[2]

Counseling of pregnant HCP and those planning to become pregnant is recommended as a part of providing episodic medical evaluations to HCP, and is paramount for safety in the workplace (see Section 1, **Medical Evaluations**, https://www.cdc.gov/infectioncontrol/guidelines/healthcare-personnel/evaluation.html).[3] Such counseling typically covers the risk of transmission of diseases (e.g., CMV, hepatitis, herpes simplex, HIV, parvovirus, rubella, varicella) that, if acquired during pregnancy, may have adverse effects on the fetus, as well as recommended infection prevention and control measures to prevent transmission. Routine exclusions from caring for patients with infections that have the potential to harm the fetus are not typically applied to HCP only on the basis of their pregnancy or intent to be pregnant because recommended precautions protect HCP from transmission. However, work restrictions for pregnant HCP may be recommended by public health authorities for some novel or high consequence pathogens.

When pregnant HCP or those intending to become pregnant have an occupational exposure or occupational acquisition of an infectious disease, OHS will typically refer the individual to their obstetric provider so that recommended treatment, postexposure management, and counseling can be collaboratively delivered. Inclusion of an individual's obstetric provider (e.g., obstetrician, family medicine provider, midwife) in their medical care is critical for their safety and health.

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Appendix 1: Abbreviations and Acronyms

Acronym	Expansion
ACH	Air Changes per Hour
ACIP	Advisory Committee on Immunization Practices
ACOEM	American College of Occupational and Environmental Medicine
B. pertussis	*Bordetella pertussis*
BMBL	Biosafety in Microbiological and Biomedical Laboratories
CDC	Centers for Disease Control and Prevention
CLIA	Clinical Laboratory Improvement Amendments
CMV	Cytomegalovirus
CRS	Congenital Rubella Syndrome
DHQP	Division of Healthcare Quality Promotion
CSF	Cerebrospinal Fluid
FMLA	Family and Medical Leave Act of 1993
GAS	Group A *Streptococcus*
HBIV	Hepatitis B Immune Globulin
HCO	Healthcare Organization
HCP	Healthcare Personnel
HICPAC	Healthcare Infection Control Practices Advisory Committee
HIV	Human Immunodeficiency Virus
IDSA	Infectious Diseases Society of America
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IPC	Infection Prevention and Control
IV	Intravenous
LP	Lumbar Puncture
MMR	Measles, Mumps, and Rubella
N. meningitidis	*Neisseria meningitidis*
NIOSH	National Institute of Occupational Safety and Health
OHS	Occupational Health Services
OSHA	Occupational Safety and Health Administration
PCR	Polymerase Chain Reaction
PEP	Postexposure Prophylaxis
PPE	Personal Protective Equipment
RADT	Rapid Antigen Detection Test
RNA	Ribonucleic Acid
RT	Reverse Transcription
RT-PCR	Reverse-Transcription Polymerase Chain Reaction
SHEA	Society for Healthcare Epidemiology of America
STSS	Streptococcal Toxic-Shock Syndrome
TB	Tuberculosis
Tdap	Tetanus, Diphtheria, Pertussis
TMP-SMZ	Trimethoprim-sulfamethoxazole
US	United States
VARIZIG	Varicella Zoster Immune Globulin
VZV	Varicella-Zoster Virus

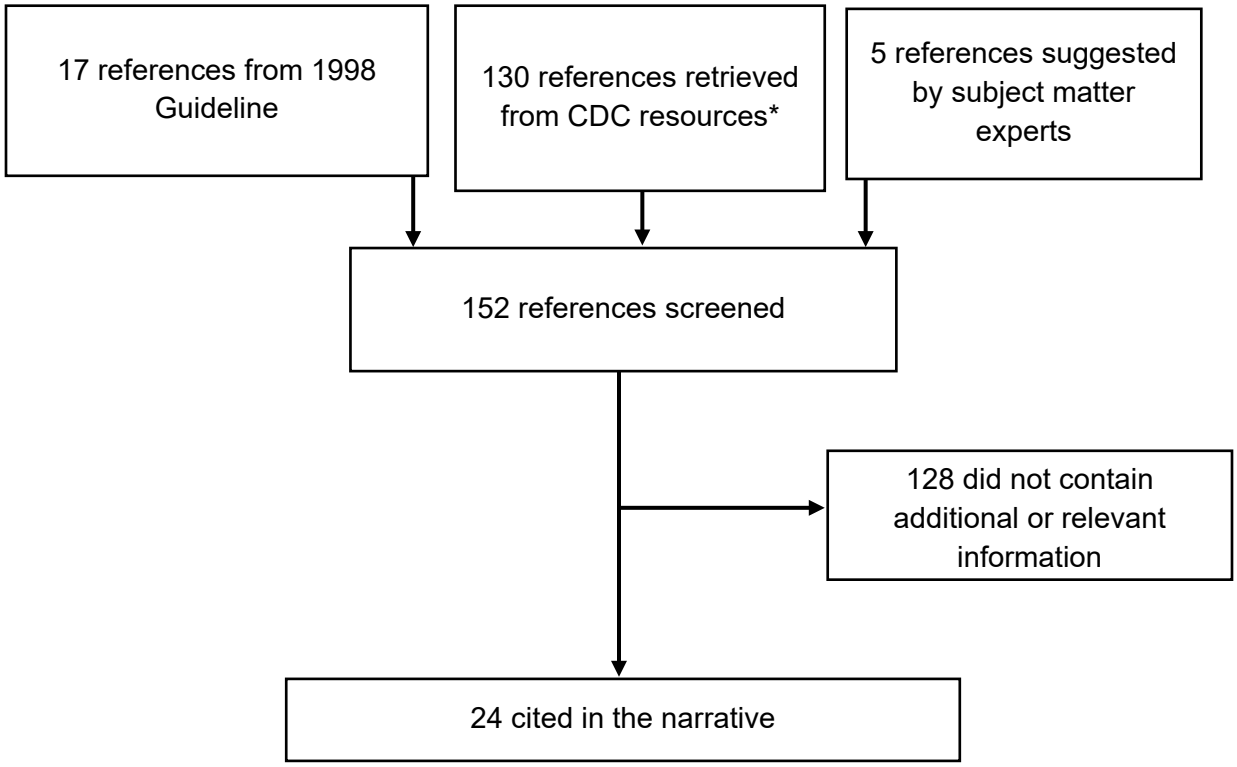
Appendix 2: Methods

Table 1 CDC Diphtheria Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Diphtheria home: https://www.cdc.gov/diphtheria/	• Diphtheria: Clinicians. https://www.cdc.gov/diphtheria/clinicians.html • Diphtheria: Diphtheria Antitoxin. https://www.cdc.gov/diphtheria/dat.html • Diphtheria: Laboratory. https://www.cdc.gov/diphtheria/laboratory.html • Information for Close Contacts of a Diphtheria Patient - Worksheet. https://www.cdc.gov/diphtheria/downloads/close-contacts.pdf	4
ACIP	• Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). • Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)	16
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 7: Diphtheria	7
Manual for the Surveillance of Vaccine-Preventable Diseases	Chapter 1: Diphtheria	32
MMWR	"toxigenic *Corynebacterium diphtheriae*"	69
CDC Resources	• *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings* - Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*	2

*** e.g., webpage, article, guideline**

Figure 1 Results of Reference Selection Process: Diphtheria



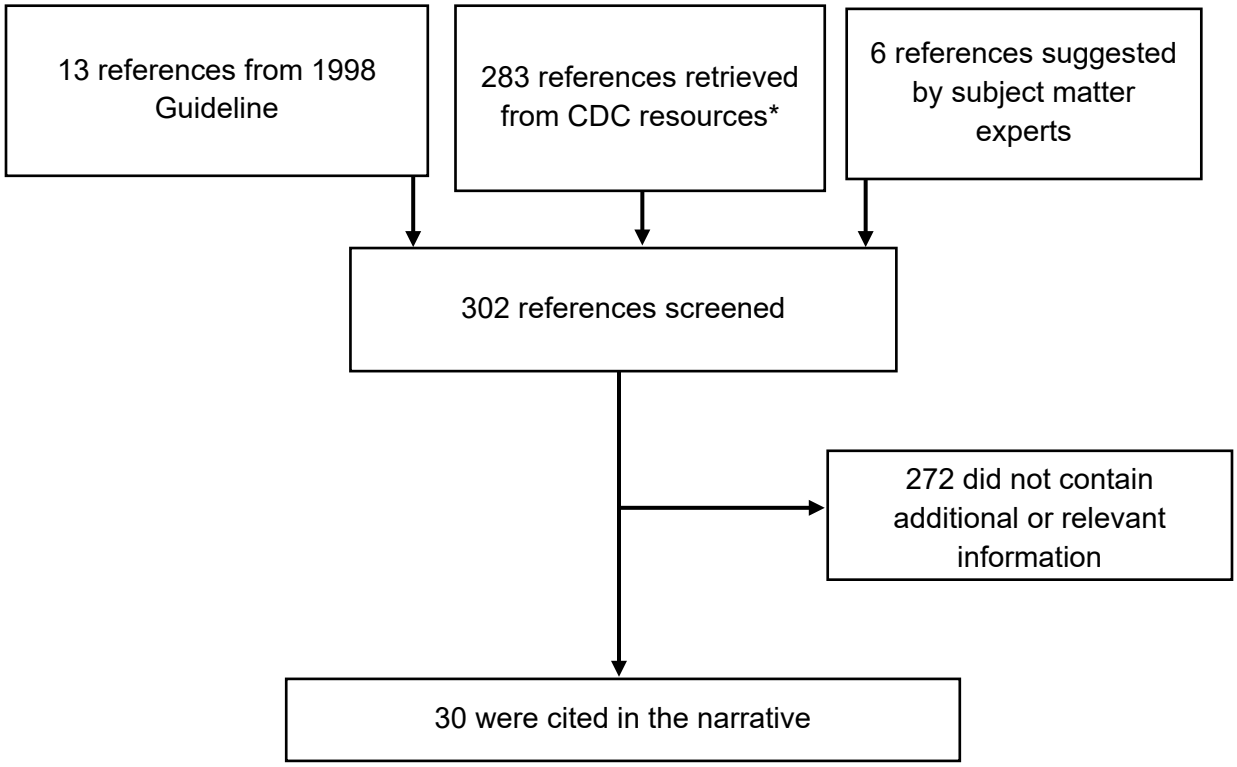
*** Refer to Table 1 for details on CDC resources consulted**

Table 2 CDC Group A *Streptococcus* Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Streptococcus, group A infection home: https://www.cdc.gov/groupastrep/	• Group A Streptococcal (GAS) Disease: Pharyngitis (Strep Throat). https://www.cdc.gov/groupastrep/diseases-hcp/strep-throat.html • Group A Streptococcal (GAS) Disease: Necrotizing Fasciitis: All You Need to Know. https://www.cdc.gov/groupastrep/diseases-public/necrotizing-fasciitis.html • Group A Streptococcal (GAS) Disease Publications and Guidelines: Outbreaks. https://www.cdc.gov/groupastrep/publications.html#outbreaks	3
MMWR	"'group a' *streptococcus* healthcare"	221
CDC Resources	• Prevention of invasive group A streptococcal disease among household contacts of case patients and among postpartum and postsurgical patients: recommendations from the Centers for Disease Control and Prevention • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*	59

*** e.g., webpage, article, guideline**

Figure 2 Results of Reference Selection Process: Group A *Streptococcus*



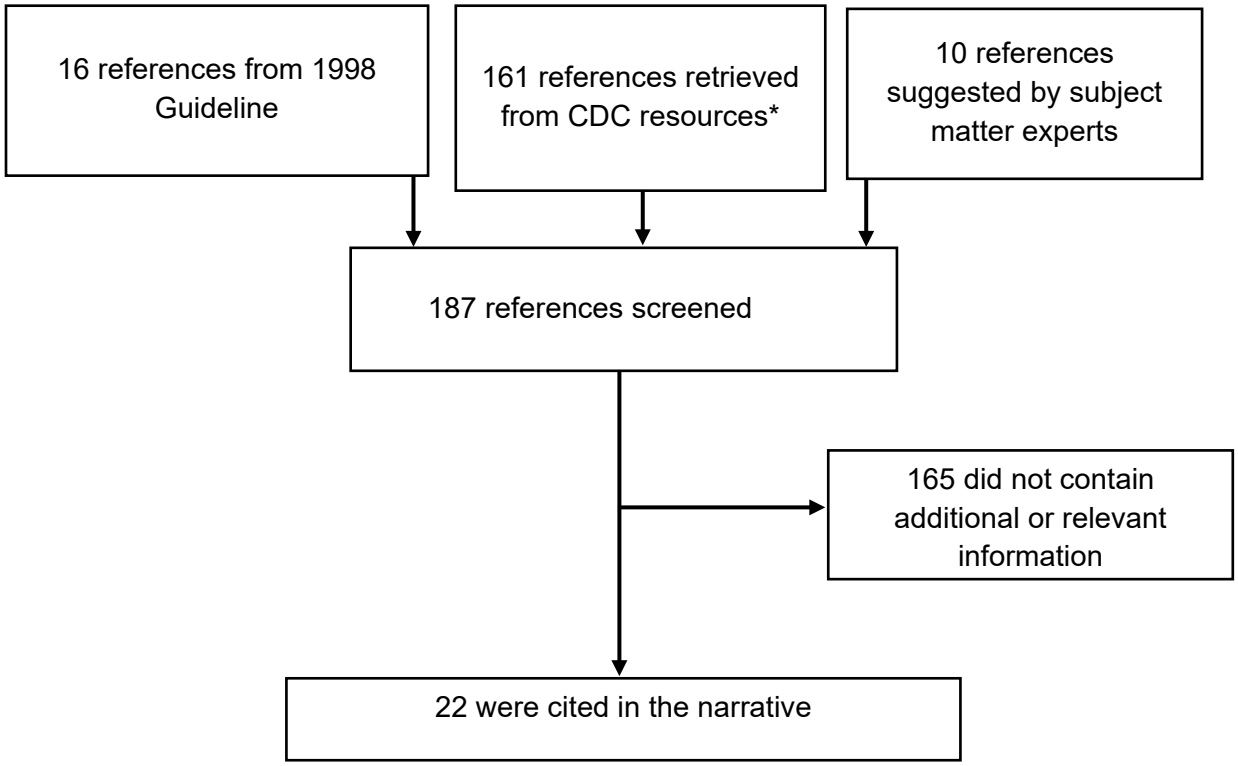
*** Refer to Table 2 for details on CDC resources consulted**

Table 3 CDC Measles Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Measles home: https://www.cdc.gov/measles/index.html	• Measles (Rubeola): For Healthcare Professionals: https://www.cdc.gov/measles/index.html	4
ACIP	• Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP) • MMR Advisory Committee on Immunization Practices (ACIP) Vaccine Recommendations (Measles, Mumps and Rubella) • Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)	12
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 13: Measles	21
Manual for the Surveillance of Vaccine-Preventable Diseases	Chapter 7: Measles	46
MMWR	"measles, rubeola"	75
CDC Resources	• *CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings 2022)* • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)* • Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings: https://www.cdc.gov/infectioncontrol/guidelines/measles/index.html	3

*** e.g., webpage, article, guideline**

Figure 3 Results of Reference Selection Process: Measles



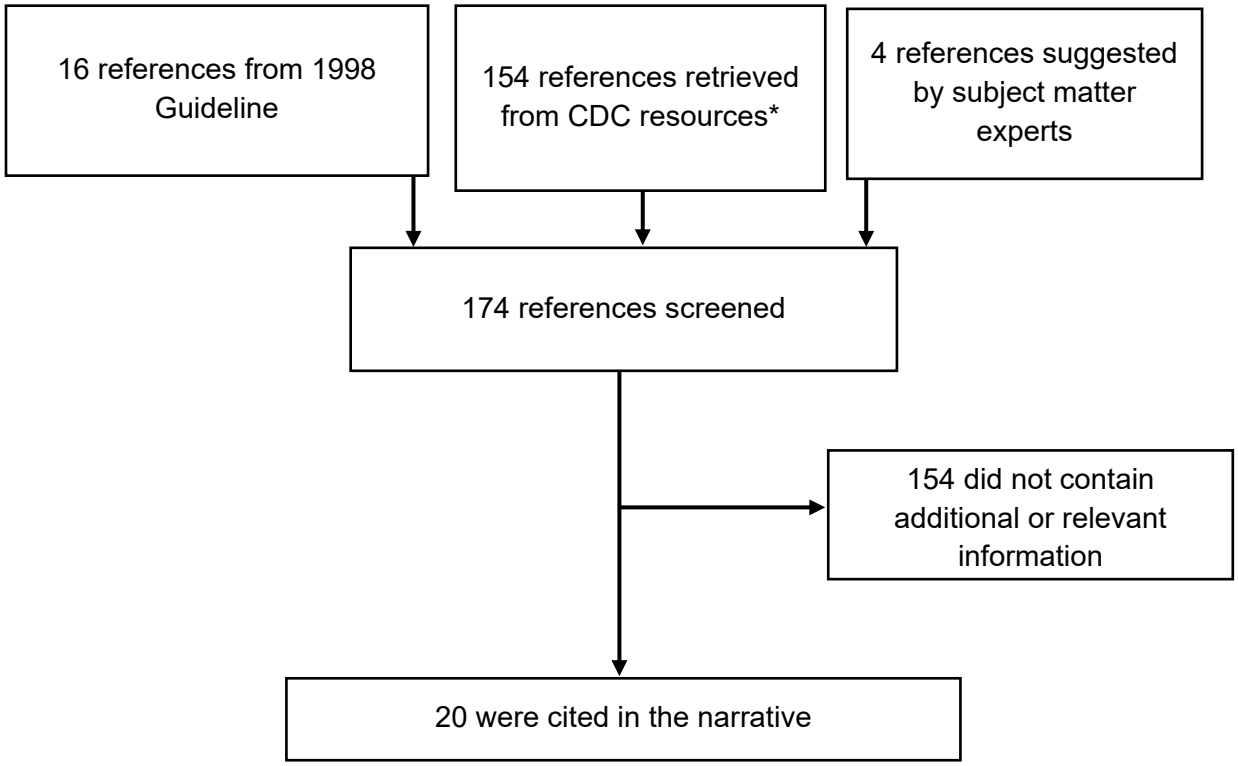
*** Refer to Table 3 for details on CDC resources consulted**

Table 4 CDC Meningococcal Disease Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Meningococcal Disease home: https://www.cdc.gov/meningococcal/index.html	• Meningococcal Disease: Technical and Clinical Information. https://www.cdc.gov/meningococcal/clinical-info.html • Guidance for the Evaluation and Public Health Management of Suspected Outbreaks of Meningococcal Disease https://www.cdc.gov/meningococcal/downloads/meningococcal-outbreak-guidance.pdf • Meningitis: Laboratory Methods for the Diagnosis of Meningitis Caused by *Neisseria meningitidis*, *Streptococcus pneumoniae*, and *Haemophilus influenzae* https://www.cdc.gov/meningitis/lab-manual/index.html	3
ACIP	• Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP) • Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP) • Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal Vaccine - Advisory Committee on Immunization Practices	3
Epidemiology and Prevention of Vaccine-Preventable Diseases ("Pink Book")	Chapter 14: Meningococcal Disease	12
Manual for the Surveillance of Vaccine-Preventable Diseases	• Chapter 8: Meningococcal Disease • Vaccines and Preventable Diseases: Meningococcal: Who Needs to Be Vaccinated? https://www.cdc.gov/vaccines/vpd/mening/hcp/who-vaccinate-hcp.html	37
MMWR	"*Neisseria meningitidis* healthcare"	96
CDC Resources	• *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings* - Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* • *Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th Edition*	3

*** e.g., webpage, article, guideline**

Figure 4 Results of Reference Selection Process: Meningococcal Disease



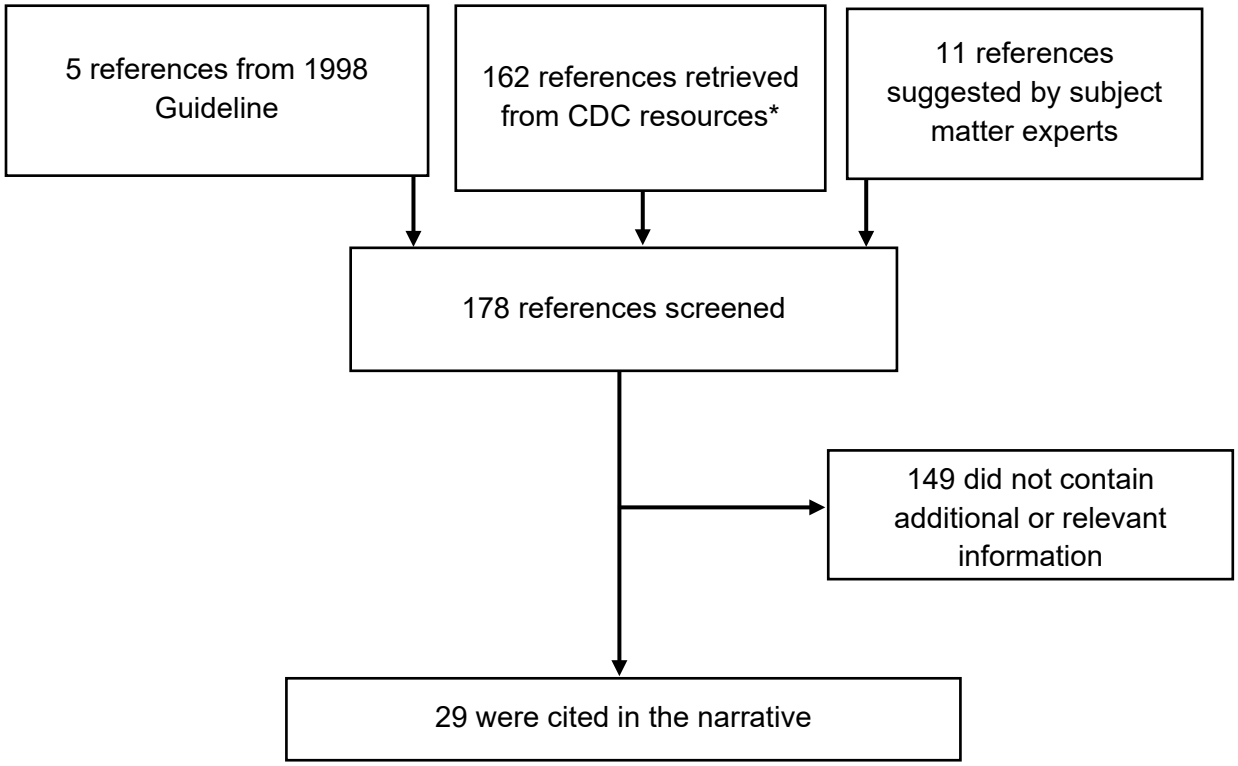
*** Refer to Table 4 for details on CDC resources consulted**

Table 5 CDC Mumps Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Mumps home: https://www.cdc.gov/mumps/index.html	• Mumps: For Healthcare Providers: https://www.cdc.gov/mumps/hcp.html • Mumps: For Healthcare Providers: Complications: https://www.cdc.gov/mumps/hcp.html#complications • Mumps: Laboratory Testing for Mumps Infection: https://www.cdc.gov/mumps/lab/index.html • Mumps: Mumps Cases and Outbreaks: https://www.cdc.gov/mumps/outbreaks.html • Mumps: Strategies for the Control and Investigation of Mumps Outbreaks: https://www.cdc.gov/mumps/health-departments/strategies.html • Mumps: Strategies for the Control and Investigation of Mumps Outbreaks: Recommend a third dose of MMR vaccine for groups at increased risk: https://www.cdc.gov/mumps/health-departments/strategies.html#recommend • Mumps: Strategies for the Control and Investigation of Mumps Outbreaks: Setting-specific guidance and resources: https://www.cdc.gov/mumps/health-departments/strategies.html#guidance • Mumps: Strategies for the Control and Investigation of Mumps Outbreaks: Identify: https://www.cdc.gov/mumps/health-departments/strategies.html#identify	8
ACIP	• Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP) • MMR Advisory Committee on Immunization Practices (ACIP) Vaccine Recommendations (Measles, Mumps and Rubella) • Recommendation of the Advisory Committee on Immunization Practices for Use of a Third Dose of Mumps Virus-Containing Vaccine in Persons at Increased Risk for Mumps During an Outbreak • Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)	21
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 15: Mumps	13
Manual for the Surveillance of Vaccine-Preventable Diseases	Chapter 9: Mumps Chapter 22: Laboratory Support for Surveillance of Vaccine-Preventable Diseases	83
MMWR	"mumps"	35
CDC Resources	• *CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings (2022)* • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)*	2

*** e.g., webpage, article, guideline**

Figure 5 Results of Reference Selection Process: Mumps



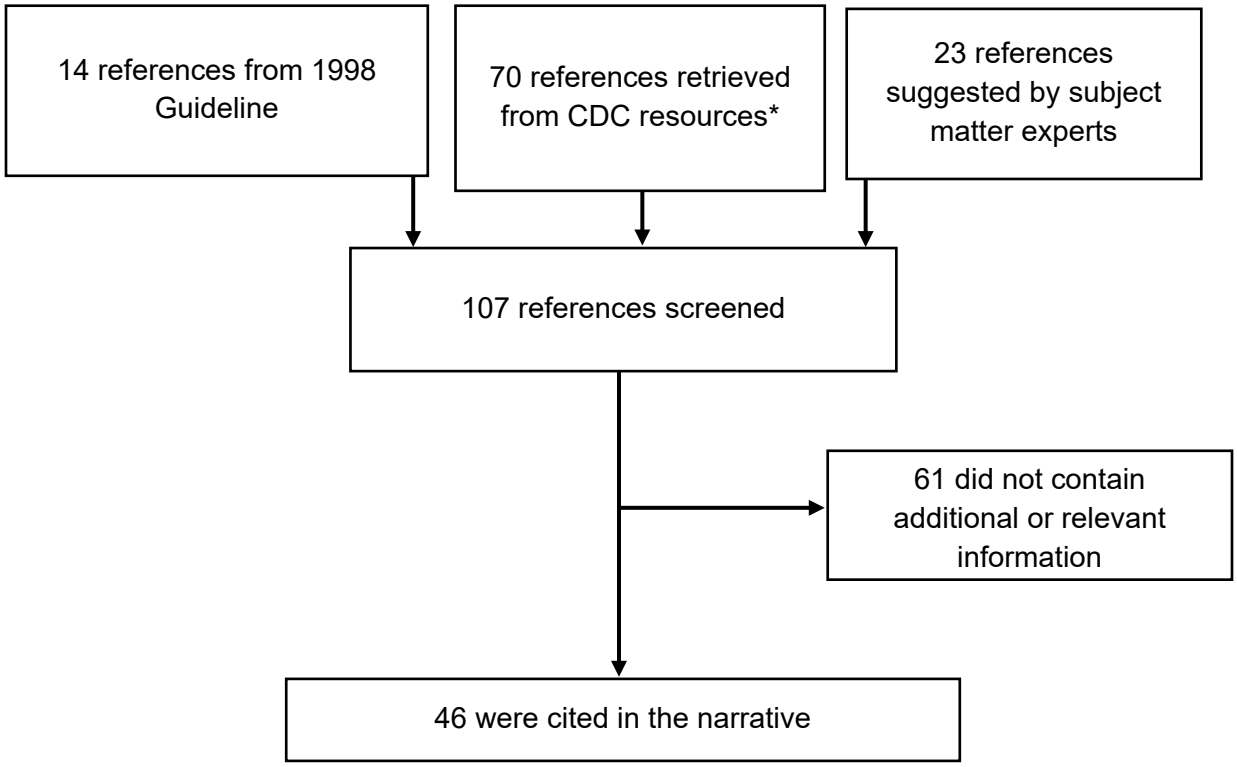
*** Refer to Table 5 for details on CDC resources consulted**

Table 6 CDC Pertussis Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Pertussis home: https://www.cdc.gov/pertussis/	• Pertussis (Whooping Cough): Clinicians https://www.cdc.gov/pertussis/clinical/index.html • Pertussis (Whooping Cough): Clinical Features. https://www.cdc.gov/pertussis/clinical/features.html • Pertussis (Whooping Cough): About Pertussis Outbreaks. https://www.cdc.gov/pertussis/outbreaks/about.html • Pertussis (Whooping Cough): Postexposure Antimicrobial Prophylaxis. https://www.cdc.gov/pertussis/pep.html • Pertussis (Whooping Cough): Diagnostic Testing https://www.cdc.gov/pertussis/clinical/diagnostic-testing/index.html	5
ACIP	• Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP) • Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP).	22
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 16: Pertussis	7
Manual for the Surveillance of Vaccine-Preventable Diseases	• Chapter 10: Pertussis • Evaluating Revaccination of Healthcare Personnel with Tdap: Factors to Consider https://www.cdc.gov/vaccines/vpd/pertussis/tdap-revac-hcp.html.	33
CDC Resources	• *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings* - Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* • Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC Guidelines https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm	3

*** e.g., webpage, article, guideline**

Figure 6 Results of Reference Selection Process: Pertussis



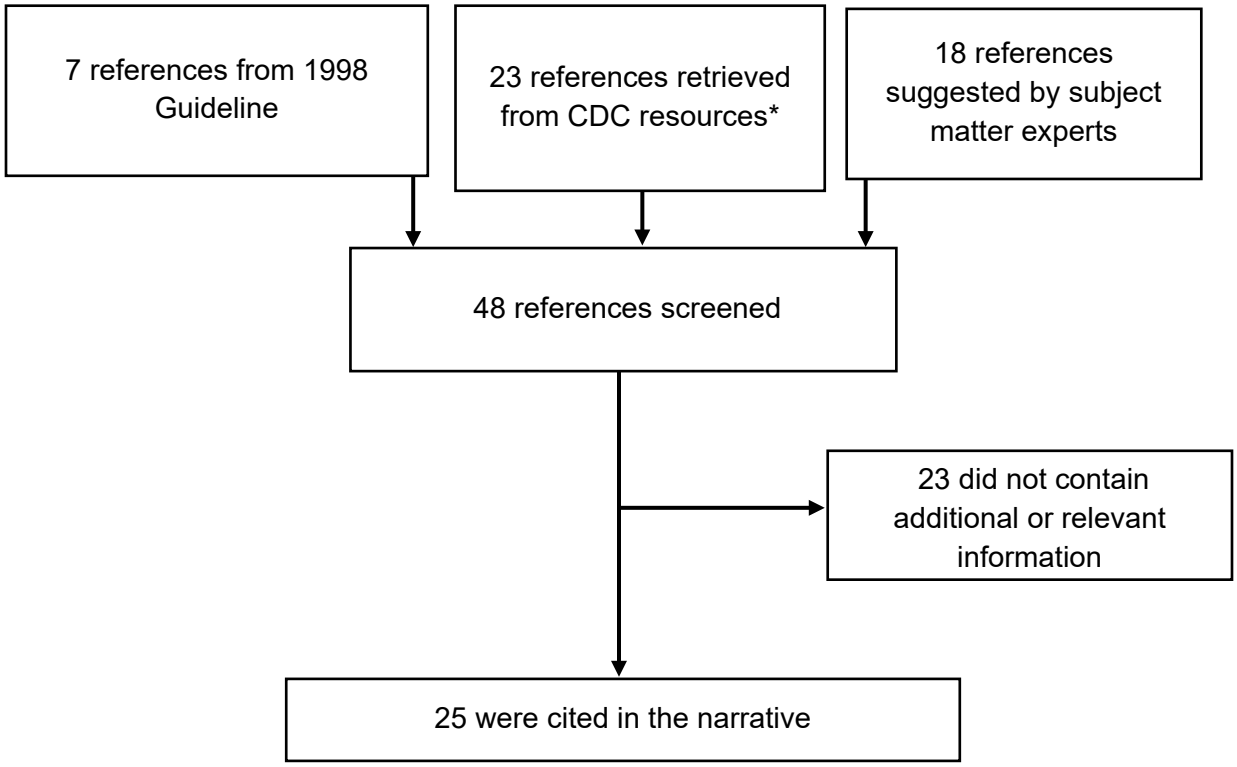
*** Refer to Table 6 for details on CDC resources consulted**

Table 7 CDC Rabies Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Rabies home: https://www.cdc.gov/rabies/index.html	• Rabies: Exposure https://www.cdc.gov/rabies/exposure/index.html • Rabies: Diagnosis in Animals and Humans https://www.cdc.gov/rabies/diagnosis/animals-humans.html • Rabies: Preexposure Vaccinations https://www.cdc.gov/rabies/specific_groups/travelers/pre-exposure_vaccinations.html • Rabies: Transmission https://www.cdc.gov/rabies/transmission/index.html • Rabies: Signs and Symptoms https://www.cdc.gov/rabies/symptoms/index.html • Rabies: State and Local Rabies Consultation Resources https://www.cdc.gov/rabies/resources/contacts.html • Rabies: Information for Healthcare Providers https://www.cdc.gov/rabies/specific_groups/hcp/index.html	12
ACIP	• Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies	1
MMWR	"Rabies virus"	28
HICPAC Resources	• *Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings* - Recommendations of the Healthcare Infection Control Practices Advisory Committee (HICPAC) • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings* • *Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th Edition*	3

*** e.g., webpage, article, guideline**

Figure 7 Results of Reference Selection Process: Rabies



*** Refer to Table 7 for details on CDC resources consulted**

Table 8 CDC Rubella Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Rubella home: https://www.cdc.gov/rubella/index.html	• Rubella: For healthcare professionals: https://www.cdc.gov/rubella/hcp.html	3
ACIP	• Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP) • MMR Advisory Committee on Immunization Practices (ACIP) Vaccine Recommendations (Measles, Mumps and Rubella) • Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)	3
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 20: Rubella	16
Manual for the Surveillance of Vaccine-Preventable Diseases	Chapter 14: Rubella	17
MMWR	"rubella, German measles, three-day measles"	6
CDC Resources	• *CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings (2022)* • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)*	2

*** e.g., webpage, article, guideline**

Table 9 CDC Varicella-Zoster Virus Resources Consulted

Source	Website browsed or keyword(s) used	Results*
Varicella home: https://www.cdc.gov/chickenpox/index.html Herpes Zoster home: https://www.cdc.gov/shingles/index.html	• Chickenpox (Varicella): For Healthcare Professionals: https://www.cdc.gov/chickenpox/hcp/index.html • Chickenpox (Varicella): Laboratory Testing for VZV: https://www.cdc.gov/chickenpox/lab-testing/index.html • Chickenpox (Varicella) for Healthcare Professionals: Clinical Features: https://www.cdc.gov/chickenpox/hcp/index.html#features • Chickenpox (Varicella) for Healthcare Professionals: People at High Risk for Severe Varicella: https://www.cdc.gov/chickenpox/hcp/index.html#high-risk-people • Shingles (Herpes Zoster) for Healthcare Professionals: Preventing Varicella-Zoster Virus (VZV) Transmission from Zoster in Healthcare Settings: https://www.cdc.gov/shingles/hcp/hc-settings.html • Shingles (Herpes Zoster): Transmission: https://www.cdc.gov/shingles/about/transmission.html • Shingles (Herpes Zoster) for Healthcare Professionals: Diagnosis & Testing: https://www.cdc.gov/shingles/hcp/diagnosis-testing.html • Shingles (Herpes Zoster) for Healthcare Professionals: Clinical Overview: https://www.cdc.gov/shingles/hcp/clinical-overview.html	8
ACIP	• Varicella ACIP Vaccine Recommendations: Advisory Committee on Immunization Practices (ACIP) • Zoster (Shingles) ACIP Vaccine Recommendations: Advisory Committee on Immunization Practices (ACIP) • Immunization of health-care personnel: recommendations of the Advisory Committee on Immunization Practices (ACIP)	17
Epidemiology and Prevention of Vaccine-Preventable Diseases. ("Pink Book")	Chapter 22: Varicella Chapter 23: Zoster	34
Manual for the Surveillance of Vaccine-Preventable Diseases	Chapter 17: Varicella Chapter 22: Laboratory Support for Surveillance of Vaccine-Preventable Diseases	87
MMWR	"varicella-zoster, herpes zoster, varicella, chickenpox, shingles"	9
CDC Resources	• *CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings (2022)* • *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)*	2

*** e.g., webpage, article, guideline**

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Declarations of Interest

None of the Workgroup members reported financial or intellectual interests related to the topics in this review except for the following:

- Hilary Babcock: Society for Healthcare Epidemiology of America liaison to HICPAC.
- Ruth Carrico: Speaker and consultant for Pfizer; speaker for Sanofi Pasteur; consultant for Medscape; speaker and workgroup member of the Gerontological Society iCAMP workshop committee; recipient of research award from Pfizer and research subaward from CDC (via Catholic Charities).
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