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Inside

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Follow new rabies guidelines, or you may overuse or misuse vaccines

Centers for Disease Control addresses post-exposure prophylaxis

When a patient arrives at the ED with a dog bite, your first instinct may be to give a rabies vaccine automatically. However, new guidelines published by the Atlanta-based Centers for Disease Control and Prevention (CDC) can impact the way you give a vaccine, and if you give the vaccine at all, notes **Jean Proehl**, RN, MN, CEN, CCRN, president of the Emergency Nurses Association in Des Plaines, IL.

The guidelines were developed by the CDC's Advisory Committee on Immunization Practices to promote appropriate use of post-exposure prophylaxis (PEP) regimens, notes **Charles Rupprecht**, VMD, MS, PhD, chief of the CDC's Rabies Section and director of the World Health Organization's Collaborating Center for Reference and Research on Rabies, both based in Atlanta. **(See excerpt, inserted in this issue. See source box, p. 2, for information on ordering full guidelines.)**

"The last strategy over the previous decade under The Healthy Persons 2000 Program was not very successful," he reports. "It was striving to cut the absolute number of human rabies exposures in half by the year 2000."

This effort was made difficult by increases in animal rabies, lack of a reporting

EXECUTIVE SUMMARY

New guidelines were created by the Centers for Disease Control and Prevention to promote appropriate use of post-exposure prophylaxis regimens for rabies.

- Rabies vaccine should not be injected into the gluteal muscle.
- As much rabies immune globulin as possible should be infiltrated into the wound.
- Ferrets are managed as other domestic pets in terms of surveillance and testing.
- There is increased concern about exposure to bats.

system, and hence, no surveillance. It was largely unsuccessful, says Rupprecht. "So, for the next decade, instead of attempting to reduce exposures in half, the new guidelines underline what is and what is not the appropriate use of PEP." **(See related story, p. 4.)**

Here is a summary of the changes in the new guidelines:

• The vaccine should not be injected into the gluteal muscle.

"There have been vaccine failures associated with gluteal administration," notes Proehl. In adults, use the deltoid site, she says. For children, the anterior or lateral thigh may be used.

Injecting vaccine into the gluteal muscle could possibly result in a human rabies case, warns Rupprecht. "When an exposure occurs, there are three things you want to do: Infiltrate immune globulin in and around the wound. Infiltrate vaccine into the muscle. But you don't want it to go into adipose tissue. There have been cases where inoculation into such tissue is believed to have resulted in a human rabies case."

• Don't overuse PEP.

Although approximately 100 people a day may undergo PEP on average, there have been no vaccine failures in the United States. "That's because PEP is overused, so probably only a minority of people are ever truly at risk," says Rupprecht. "It also tells us how efficacious these current biologicals are."

However, in other parts of the world, when PEP guidelines have not been followed, human rabies has resulted. "Those usually entail situations when an exposure is recognized, but PEP is not used, or delayed, or used inappropriately," says Rupprecht. "Those are not situations we wish to have occur in the U.S."

PEP is expensive, so when it's not indicated, large amounts of time and money are needlessly wasted, he maintains.

• Don't delay vaccination.

"One of the major factors why vaccine failures happen are related to delays after exposure occurs and when the patient finally presents," notes Rupprecht.

Information sheets can help ensure that patients comply with necessary follow-up care after an animal bite. "Our ED uses a specific patient instruction sheet regarding animal bites at risk for rabies," reports Proehl. The form contains specific instructions for after care and when patients should come back to the ED. **(See form for Animal Bite at Risk for Rabies, p. 3.)**

• As much rabies immune globulin (RIG) as possible should be infiltrated into the wound.

The remaining RIG is given intramuscular (IM) in a different site than the vaccine, and the gluteals should not be used, says Proehl. "The previous recommendation was to infiltrate half into the wound and give half IM."

There was no scientific basis for that previous practice, stresses Rupprecht. "You are trying to get the RIG to the inoculated site where the rabies virus is, to supply virus neutralizing antibodies," he says. "If that's the case, why would you ever be giving half and half? It was a rule of thumb without any substantiation, which may lead to a less-than-ideal response."

It's sometimes not possible to give all the RIG in a single site, notes Rupprecht. "In that case, as much as

(Continued on page 4)

SOURCES

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- **Charles Rupprecht**, VMD, MS, PhD, National Center for Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road, MS G33, Atlanta, GA 30333. Telephone: (404) 639-1050. Fax: (404) 639-1058. E-mail: cyr5@cdc.gov.

To obtain a copy of the complete text of the rabies guidelines or a copy of the Possible Human Rabies — Patient Information Form, contact:

- **National Center for Infectious Disease**, Centers for Disease Control and Prevention, 1600 Clifton Road N.E., Atlanta, GA 30333. Telephone: (404) 639-1050. Fax: (404) 639-1058. Web: www.cdc.gov/ncidod/dvrd/rabies.

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Animal Bite at Risk for Rabies

You have been bitten by an animal that may be rabid. Rabies has been spreading in many areas of North America in the last 10 years. Because rabies is usually a fatal disease, we have started shots to protect you. It is important that you follow the instructions below:

What to do:

Return to _____ for the rest of your rabies shots on the following days:
1. Day 3 _____
2. Day 7 _____
3. Day 14 _____
4. Day 28 _____

The arm where you got your shot may be slightly red, swollen, and sore for a few days. Applying ice to the area may help the discomfort. You may also have a mild headache, nausea, and a low fever and feel tired for a few days after the shot.
Keep the bite wound clean and dry. Use mild soap and water to clean the wound twice a day.

By law, we must report this bite to the authorities. Contact _____ (Telephone _____), if you have any questions.

When to call a doctor or return to the Emergency Department:

- Signs of infection in the bite: redness, swelling, draining pus, or fever.
- New pain or numbness in the area of the bite.
- Cough, chills, sore throat, abdominal pain, nausea, vomiting, or diarrhea.

In the future:

- If you see a doctor for any illness in the next three months, tell him or her about this bite.
- Avoid feeding or touching wild or stray animals. Call the local animal control agency or the police to report animals behaving strangely. Rabid animals may be aggressive, agitated, or hyperactive. However, rabid animals may appear healthy for several days before symptoms appear.
- If you or anyone else is bitten, immediately clean the bite with lots of soap and water. If you can safely cage the animal, do so, but be careful that no one else is bitten. The rabies shots you are getting for this bite do NOT protect you from future bites. See a doctor if you are bitten again.
- Make sure your pets are immunized against rabies.

Source: Proehl JA, Jones LM. *Mosby's Emergency Department Patient Teaching Guides.* Mosby Year-Book Inc; 1998. Used with permission.

possible should be infiltrated locally, and the remainder inoculated into an IM site," he says.

• **Manage ferrets as other domestic pets.**

Ferrets were not mentioned in the previous guidelines, notes Proehl. "In these guidelines, the direction is to manage them as you would a domestic dog in terms of surveillance and testing," she says.

• **Vaccinate when patients are exposed to bats, even when there is no bite.** Several cases of bat-associated human rabies have occurred in which there is no definitive bite or scratch, notes Proehl. "So, it is now recommended than anyone who has direct contact with a bat; any unattended child/developmentally delayed person found in a room with a bat; or anyone who awakes to find a bat in their room be vaccinated," she explains.

• **Be aware that all vaccines currently approved are equally effective.**

Four formulations of three rabies vaccines are approved for use in the United States. They include two forms of the human diploid cell vaccine, rabies vaccine adsorbed, and purified chick embryo cell vaccine. All types are considered equally safe and effective, according to the guidelines.

Only the Imovax rabies vaccine (human diploid cell vaccine, manufactured by Connaught Laboratories in Swiftwater, PA) has been approved by the Food and Drug Administration for the intradermal dose and route for pre-exposure vaccination. "We will stay with the vaccine that we currently are using [Imovax], unless a significant positive benefit is demonstrated from one of the other preparations," says Proehl.

• **Submit form to CDC.**

The CDC requests health care providers to submit a form for antemortem testing of human rabies cases. **(See source box, p. 2, for information on obtaining a copy of the Possible Human Rabies — Patient Information Form.)** This form is used for two primary reasons, notes Rupprecht:

1. The majority of cases are negative, and these data are useful for additional case discussion and differential diagnosis of open encephalitis cases.

2. If samples are positive, it provides important epidemiological information that is usually not provided on routine submission forms. ■

Should you vaccinate? Consider these factors

Consider the nature of the exposure, the severity of the bite, disposition of the animal, and species when deciding whether to administer a rabies vaccine, stresses **Charles Rupprecht**, VMD, MS, PhD, chief of the Centers for Disease Control and Prevention's (CDC) Rabies Section and director of the World Health Organization's Collaborating Center for Reference and Research on Rabies, both based in Atlanta.

Work with an infectious disease physician on staff at the hospital or local and state public health departments to assess the potential for rabies exposure, he recommends. Here are factors to consider:

• **Availability of the animal for observation.**

Patients often are given rabies vaccines when they're not necessary, Rupprecht says.

"When an owned, well-supervised, vaccinated, and apparently healthy dog bites someone after provocation and is available for observation, that is inappropriate for PEP [post-exposure prophylaxis regimens]," he says. "Given how common dog bite is, one should not be giving PEP automatically."

Any transdermal or mucous membrane exposure from a potentially rabid mammal constitutes an exposure, Rupprecht explains. "But if the dog, cat, or ferret is in hand, the animal should be observed for a 10-day period. If the animal remains healthy, it was not presumed to be infectious at the time the exposure occurred."

If the animal is wild and not domestic, or is not available for observation, public health officials should be contacted to determine the likelihood of rabies, advises Rupprecht. Consider the following points:

— Was the bite provoked?

— What was the severity of exposure (bite or nonbite)?

— Was the animal apparently healthy at the time?

— What are the local rabies statistics? Those statistics should be available at your local or state health department.

• **Region.** The way an animal bite is managed when a dog is unavailable for testing can vary widely in different parts of the country, Rupprecht explains. "In the Pacific Northwest, where the incidence of rabies may be very low, it's a much different situation than in areas where we share a border with Mexico and free-ranging dogs could cause the incidence of rabies to be higher."

• **Species.** Even among wild species, an animal bite may not constitute rabies exposure. "Rodent bites are quite common especially in large cities, but there has never been a recorded case of rabies transmission from rodent to person," says Rupprecht. Raccoons, skunks, foxes, bats, and coyotes are the animals most often infected with rabies, he notes.

• **Side effects of vaccines.** Although the rabies

vaccines are very safe, several side effects can occur. "These haven't been life-threatening, but can range from uncomfortable to temporarily incapacitating," says Rupprecht. "Nobody wants a needle with a foreign antigen to be inoculated in their arm if it is not necessary."

Adverse effects include local pain and swelling, risk of fever and nausea, and in some cases, a delayed hypersensitivity reaction, he notes. ■

Cutting-edge protocol available for vaccines

Patients can benefit from receiving pneumococcal and influenza vaccines in some EDs, argues **Susan M. Ray**, MD, principal investigator for the pneumococcal vaccine intervention project at Grady Health System in Atlanta. Grady cares for an urban, indigent, minority population.

There is a lot of controversy about giving vaccines in the ED, since many clinicians feel vaccines should be given by primary care physicians to avoid overwhelming already overworked staff, explains **Katherine L. Heilpern**, MD, FACEP, interim residency director and assistant professor in the department of emergency medicine at Emory University School of Medicine in Atlanta.

Whether or not you should vaccinate in the ED depends on where you practice, she says.

In large, urban settings, the ED may be the patient's sole access to care. Thus, it makes good sense to be very aggressive about vaccinating patients, she says. "For others where there is a good referral pattern and you can get someone to their primary care practitioner in a day or two, then I think it probably is OK to defer," Heilpern says.

"In many hospitals [such as Grady], the ED represents an important 'missed opportunity' for giving adult vaccines," stresses Ray.

EXECUTIVE SUMMARY

Research has shown that patients benefit from receiving pneumococcal and influenza vaccines in the ED.

- Protocols requiring nurses to screen patients for vaccine indications and initiate orders are appropriate in EDs that care for urban, indigent, minority populations.
- The only adult vaccine that is *not* overlooked in the ED is tetanus.
- Hepatitis vaccines (A and B) require multiple doses, so they are probably better suited for continuity clinic settings.

SOURCE

For more information about vaccine protocols in the ED, contact:

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ED nurses screen all patients

ED nurses should take advantage of that opportunity and ensure that patients don't slip through the cracks, Ray says. A unique protocol was developed at Grady that requires nurses to screen patients for vaccine indications and initiate orders.

At Grady Health System's ED, about 55% of patients have indications for the pneumococcal vaccine and thus would also have indications for the influenza vaccine, reports Ray. "Of these patients, more than 50% indicated that the ED was their sole source of care," she says.

However, less than 10% of the patients with indications were vaccinated, notes Ray. "Thus, in our patient population, the ED represents an excellent opportunity for vaccination of adults with indications for pneumococcal vaccine or flu vaccine," she says.

A similar study of ED patients at Emory Hospital's emergency department, which sees a suburban, nonindigent, nonminority population, found that about 50% of patients have vaccine indications. However, only 20% indicated the ED was their sole source of care, and 45% of those with indications had been previously vaccinated, notes Ray. "Thus, you can see that adult vaccination programs may not be appropriate in all EDs," she says.

The only adult vaccine that is *not* overlooked in the ED is tetanus, Ray says. "Both influenza and pneumococcal vaccines are excellent candidates for ED adult vaccine campaigns. Both require only a single dose for most patients." Some patients need a repeat pneumovax at five years.

Hepatitis A and B vaccines require multiple doses — two doses for Hepatitis A, three doses for Hepatitis B — and can't be completed in a single ED visit. "So they are probably better suited for continuity

clinic settings," advises Ray.

Literature on adult vaccines indicates that protocols that are automatically followed for all patients, such as prewritten standing orders, are the most successful way of ensuring vaccine delivery, Ray says.[1,2]

"However, in Georgia, there is not a clear legal allowance for nurses to administer adult vaccines without a specific MD order for each patient outside of the `public health' setting," she reports.

A protocol was developed that requires that nursing staff screen patients for pneumococcal and influenza vaccine indications.

"Nurses then prompt the MD for an order to give the vaccine when indicated," Ray explains. **(See nurse screen/provider order form and guidelines, inserted in this issue.)**

Vaccine indications are as follows:

- age 65 years or older;
- chronic respiratory disease (e.g., chronic obstructive pulmonary disease, emphysema, or asthma);
- chronic cardiac disease (e.g., congestive heart failure, cardiomyopathy, coronary artery disease, valvular heart disease, or cardiac surgery);
- chronic renal failure or nephrotic syndrome;
- diabetes mellitus;
- HIV/AIDS;
- sickle cell disease;
- chronic alcohol use;
- chronic liver disease (cirrhosis);
- history of splenectomy;
- chronic immunosuppression from any cause case (e.g., cancer or chronic steroid use).

References

1. Slobodkin D, Kitlas JL, Zielske P. Opportunities not missed — systematic influenza and pneumococcal immunization in a public inner-city emergency department. *Vaccine* 1998; 16:1,795-1,802.
2. Slobodkin D, Zielske P, Kitlas JL, et al. Demonstration of the feasibility of emergency department immunization against influenza and pneumococcus. *Ann Emerg Med* 1998; 32:537-543. ■

Infectious disease update: What you'll see this winter

Be on the lookout for a host of infectious diseases this winter, warns **Katherine L. Heilpern**, MD, FACEP, interim residency director and assistant professor in the department of emergency medicine at Emory University School of Medicine in Atlanta. "We are heading into another fairly significant season for infectious disease."

In addition to sinus infections, bronchitis, upper respiratory infections, and respiratory synsitial virus, there are many other outbreaks to watch for, stresses **Paula Heitkemper**, RN, BSN, CIC, infection control practitioner at the University Hospital in Cincinnati. **(See related stories on streptococcal disease, p. 8, strep pneumoniae, p. 8, and drug-resistant TB, p. 9.)**

Stay abreast of outbreaks occurring in your own community, says Heitkemper. "By law, infection control practitioners inform the local health department when outbreaks are occurring in the state or county. The county health departments then notify the state health departments."

With good communication, isolation can be initiated in the ED as soon as the patient arrives, says Heitkemper. "For example, I call the ED occasionally to ask physicians/staff to be watchful for certain persons in the community who may be incubating with measles or who are known to be infectious with TB, but left the hospital AMA [against medical advice]."

Here are several infectious diseases you probably will see in your ED this winter:

• ***Escherichia coli (E. coli).*** "We still appear to be dealing with occasional outbreaks of *E. coli*," says Heilpern. "We tend to see this more in the summertime, but may see more of it this fall and winter."

Most strains of *E. coli* are harmless and live in the intestines of healthy humans and animals, notes Heitkemper. "However, *E. coli* O157: H7 produces a powerful toxin and can cause severe illness," she

EXECUTIVE SUMMARY

You need to stay abreast of outbreaks that are occurring in your own community by communicating with infection control practitioners and local health departments.

- All patients who report sudden diarrhea with blood should get their stool tested for *Escherichia coli* 0157:H7.
- Suspected cases of measles should be placed in airborne precautions with negative airflow.
- Respiratory syncytial virus causes bronchiolitis, an airway infection typified by wheezing and respiratory distress, and rotavirus causes diarrhea.
- With good communication, isolation can be initiated in the ED as soon as the patient arrives.

says. "It was not recognized as a cause of illness until 1982, due to an outbreak later traced to contaminated hamburgers."

E. coli 0157:H7 is an emerging cause of foodborne illness, stresses Heitkemper. An estimated 10,000 to 20,000 cases of infection occur in the United States each year, she says. "Infection often leads to bloody diarrhea and occasionally kidney failure. Most illness has been associated with eating undercooked, contaminated ground beef."

Person-to-person contact in families and child care centers (particularly by toddlers who are not potty-trained) is also a common mode of transmission, Heitkemper notes. "Infection can occur after drinking raw milk and after swimming in or drinking sewage-contaminated water."

All persons who suddenly have diarrhea with blood should get their stool tested for *E. coli* 0157:H7, advises Heitkemper. "Persons who only have diarrhea usually recover completely," she says.

• **Measles.** The largest measles (rubeola) outbreak since 1996 has occurred in Alaska from August to November 1998.

Thirty-three cases have been reported, says Heitkemper. The index case was imported by a visitor from Japan, she says. No endemic measles virus is circulating in the United States currently, she adds.

"There was a wild measles virus strain circulating in Japan at the time of the outbreak," she says. "The outbreak was stopped following vaccination of many who had received a first dose of measles vaccine, but not a second dose."

A first dose at age 12 months provides a 95% immunity to measles, notes Heitkemper. "A second dose should be given at least 28 days after the first dose, but prior to beginning kindergarten. This is required by schools now," she says.

Throat, urine specimens available

In the ED, obtain throat and urine specimens from suspected measles cases immediately after the rash onset, so that a type can be identified, Heitkemper says. "Suspected cases of measles should be placed in airborne precautions with negative airflow," she explains.

• **Listeriosis.** There was a multistate outbreak of listeriosis occurring from August 1998 through January 1999, reports Heitkemper. Fifty cases were reported in 11 states.

"There have been six deaths and two spontaneous abortions caused by eating contaminated hot dogs or deli meats," she says.

Healthy persons rarely develop severe illness with this bacteria (Listeria monocytogenes), notes Heitkemper. "Those affected are usually pregnant women, newborns, and those with impaired immunity such as those with HIV or cancer."

Listeriosis presents with a flulike illness, fever, chills, headache, and stiff neck, notes Heitkemper. There is an incubation period of two to eight weeks after ingestion of the contaminated food, and standard precautions are recommended.

• **Pediatric respiratory syncytial virus (RSV) and rotavirus.** In infants, RSV causes bronchiolitis, an airway infection typified by wheezing and respiratory distress, and rotavirus causes diarrhea, Heilpern says. "Both of these diseases more commonly occur in the winter months."

Both of those viruses are found throughout the United States and tend to cause disease in epidemic fashion in infants and young children, notes Heilpern. "They can spread like wildfire through day care centers and pre-schools."

Begin influenza vaccines now

• **Influenza.** Influenza is one of the most highly infectious diseases you will encounter, stresses Heitkemper.

The time to begin the annual influenza vaccine immunization is October or November, says Heilpern. Any patient who is being admitted to a long-term care facility or nursing home should be vaccinated, she says. The vaccine should be continued until February or March.

All ED nurses should be vaccinated against the influenza virus every year, Heitkemper recommends. "Remember that this vaccine also takes two weeks before you will develop antibodies," she says. "So if you are exposed to the influenza within the two weeks following vaccination, you can still get sick, but will probably develop a milder case."

• **Whooping cough.** Whooping cough outbreaks occurred in Cincinnati in the summer of 1998, reports Heitkemper. Pertussis in adolescents and young adults has been increasing in frequency through out the United States.

"Many of these cases have been occurring in previously immunized persons due to waning immunity," she says.

Whooping cough is frequently underdiagnosed because it is not recognized, she notes. The main symptom is a very characteristic, repeated, violent, and paroxysmal cough which sounds like a "whoop," she says. Paroxysms are often followed by vomiting.

The mode of transmission is by direct contact with discharges from mucous membranes, Heitkemper says. Droplet precautions are recommended by the

Centers for Disease Control and Prevention, she advises. "That means wearing a mask within three feet of the patient to prevent droplets from contacting your mucous membranes." Droplet precautions do not require airborne precautions (negative air flow in an isolation room). ■

Streptococcal disease: Watch for Groups A and B

You should be on the lookout for both forms of streptococcal disease in your ED: Group A and Group B, urges **Paula Heitkemper**, RN, BSN, CIC, an infection control practitioner at the University Hospital in Cincinnati. Here are updates on each:

• **Group A streptococcal disease.** This is also known as the 'flesh-eating bacteria' and is found in necrotizing fasciitis," says Heitkemper.

Group A streptococcal invasive disease more commonly occurs with diabetics and sometimes following varicella zoster (chickenpox) in children, she says. "You won't know which bacteria is responsible until culture reports return, but classic signs of a skin or soft tissue infection should be a 'heads up,'" Heitkemper notes. "Group A streptococcus is the bacteria that causes strep throat, rheumatic heart fever, pneumonia, toxic shock syndrome, impetigo, scarlet fever, and even puerperal fever in women postpartum."

The incubation period is short, usually from one to three days, notes Heitkemper. "But patients with untreated streptococcal pharyngitis may carry the organism in the pharynx for weeks or months."

In populations where impetigo is prevalent, Group A streptococci may be recovered from the normal skin for one to two weeks before skin lesions develop, Heitkemper advises. "Group A streptococcus provides us with an example of why it is good practice to wash your hands after patient contact."

• **Group B streptococcal disease.** This can also cause necrotizing fasciitis and toxic shock syndrome and has been seen increasingly recently. "Three cases of community-acquired fasciitis, one accompanied by toxic shock, caused by Group B streptococci occurred over 10 months in Ontario and Quebec," notes Heitkemper. "Only four other cases of group B streptococcal fasciitis have been reported in the literature over the past four decades."[1]

Reference

1. Gardam MA, Low DE, Saginur R, et al. Group B streptococcal necrotizing fasciitis and streptococcal toxic shock-like syndrome in adults. *Arch Intern Med* 1998; 158:1,704-1,708. ■

Strep pneumonia becoming more antibiotic-resistant

Strep pneumonia is becoming more resistant, not only to penicillin, but also to other antibiotics, warns **Katherine L. Heilpern**, MD, FACEP, interim residency director and assistant professor in the department of emergency medicine at Emory University School of Medicine in Atlanta.

"Pneumococcus used to be exquisitely sensitive to penicillin and cephalosporins, but that is no longer the case." she says.

Unfortunately, this microbe is now developing increasing resistance to many classes of antibiotics, Heilpern says. " In some parts of the country — Atlanta, for example — pneumococcal resistance to penicillin and other beta lactam antibiotics exceeds 30%," she notes.

Pneumonia is a year-round disease, but *S. pneumoniae* has a predilection for the winter months, says Heilpern. Patients over 65, and those with chronic diseases such as diabetes, HIV, cancer, chronic obstructive pulmonary disease, severe asthma, patients on chronic steroids, sickle cell disease, and evidence of heavy alcohol abuse should receive the pneumococcal vaccine, she advises. "All

EXECUTIVE SUMMARY

Strep pneumonia (invasive pneumococcal disease) is becoming more resistant to penicillin and other antibiotics.

- Patients over age 65, and those with chronic diseases such as diabetes, HIV, cancer, chronic obstructive pulmonary disease, severe asthma, patients on chronic steroids, sickle cell disease, and evidence of heavy alcohol abuse should receive the pneumococcal vaccine.
- The pneumococcal vaccine takes two to three weeks to develop antibodies and is 60% to 70% effective in preventing invasive disease.
- Strep pneumonia kills more people in the United States every year (more than 40,000) than all other vaccine preventable diseases combined.

these conditions can predispose someone to invasive pneumococcal disease."

Strep pneumonia (invasive pneumococcal disease) kills more people in the United States every year — 40,000 or more — than all other vaccine-preventable diseases combined, says **Paula Heitkemper**, RN, BSN, CIC, infection control practitioner at University Hospital in Cincinnati.

Pneumococcal pneumonia occurs in 150,000 to 570,000 cases in the United States every year, she stresses. "This is the most common clinical presentation of invasive pneumococcal disease," Heitkemper says. "It is spread by person-to-person contact via droplets that land on the mucous membranes of your eyes, nose, mouth, if within three feet of the coughing patient, usually in the winter and early spring."

If you get the pneumococcal vaccine, it takes two or three weeks to develop antibodies. It is 60% to 70% effective in preventing invasive disease, notes Heitkemper. Pneumococcal vaccine should be administered to all individuals 65 years of age or older, adults with chronic illnesses (cardiovascular or pulmonary disease, diabetes, alcoholism, cirrhosis, or cerebrospinal fluid leaks), and those people who have had their spleen removed. ■

Here's an update on drug-resistant TB

More cases of pulmonary tuberculosis are drug-resistant than ever before, reports **Paula Heitkemper**, RN, BSN, CIC, infection control practitioner at the University Hospital in Cincinnati.

Find out whether your state or county has a problem with multidrug-resistant tuberculosis (MDRTB), she recommends. This is important to know, because the New York City-based American Thoracic Society and the Atlanta-based Centers for Disease Control and Prevention recommend initial treatment with four drugs in areas where drug resistance is 4% or greater, she says.

MDRTB is usually acquired, rather than primary, says Heitkemper. "This means that the patient with tuberculosis develops resistance over time due to nonadherence, inadequate therapy, or inappropriate drug therapy."

Katherine L. Heilpern, MD, FACEP, interim residency director and assistant professor in the department of emergency medicine at Emory University School of Medicine in Atlanta, says, "We have gotten very aggressive in tracking down patients who have multidrug-resistant TB into programs and utilizing public health nurses to make sure these patients are not out there wandering the streets. However, this is going to be a problem that continues to concern us, especially with the homeless and disenfranchised population."

ED nurses should have a high index of suspicion for tuberculosis in homeless patients, especially men, advises Heitkemper. "In many large cities, the homeless

EXECUTIVE SUMMARY

Cases of drug-resistant pulmonary tuberculosis continue to increase.

- Find out whether your state or county has a problem with multidrug resistant tuberculosis
- Initial treatment with four drugs is recommended in areas where drug resistance is 4% or greater.
- Have a high index of suspicion for tuberculosis in homeless patients, especially men.

Are you sure antibiotics are needed? Follow these rules

Antibiotics should not be prescribed for patients with conditions that are clearly viral in nature, says **Katherine L. Heilpern**, MD, FACEP, interim residency director and assistant professor in the department of emergency medicine at Emory University School of Medicine in Atlanta.

"Patients with upper respiratory tract infections, such as bronchitis and many episodes of pharyngitis, do not need antibiotics," she stresses.

When sore throat is associated with laryngitis or nasal congestion, antibiotics are usually not needed, stresses Heilpern. "Cough is not usually associated with classic strep throat. If you can do a rapid strep screen in a patient with isolated sore throat, or if the patient has isolated sore throat, fever, and tender anterior cervical lymph nodes, they should probably get treated."

Clearly, there are other bacterial pathogens that can cause pharyngitis, but you need to determine if strep is responsible, Heilpern cautions. "We still have to remain vigilant for the consequences of inadequate treatment of strep pharyngitis/rheumatic fever. This is why we try to make the diagnosis of Group A streptococcal pharyngitis and initiate appropriate antibiotic therapy." ■

SOURCES

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stay overnight at shelters, sleeping in large rooms with very poor air circulation. The more fresh air that enters the room [thus dilating the Mycobacterium tuberculosis bacteria], the more it costs the homeless shelter for energy costs. Thus, homeless shelters are notorious for poor air circulation and the spread of tuberculosis from one person to another."

Alcoholics, the elderly, and the malnourished are especially prone to tuberculosis, due to poor resistance to disease of any kind, notes Heitkemper. "Homeless patients who were seen in the ED, diagnosed with tuberculoses, admitted, treated, and discharged, frequently leave against medical advice [AMA] from the long-term care facility they were transported to; only to return to the ED weeks or months later with unresolved tuberculosis."

A positive skin test (PPD) only indicates that the patient has been infected with tuberculosis, cautions Heitkemper. "A positive PPD skin test does not necessarily mean that the patient has the disease unless they have symptoms of disease such as night sweats, weight loss, fever, productive cough, and positive chest X-ray consistent with cavitary lesions, especially in upper lobes."

A person is usually no longer infectious after two weeks of effective drug therapy if the patient shows signs of clinical improvement, chest infiltrates and fever have resolved, appetite has improved, coughing has diminished, and sputum cultures and smears are negative, says Heitkemper.

When a patient with a positive PPD skin test is taking only isoniazid (INH), they aren't necessarily infectious to others, notes Heitkemper. "The INH is given prophylactically to keep the patient from developing disease. If the patient had disease, he/she would be taking three to four drugs as therapy." ■

What to expect when SSRIs are discontinued

When selective serotonin reuptake inhibitors (SSRIs) are abruptly discontinued, patients may come in to the ED with symptoms including dizziness, nausea, lethargy, and headache, says **Robert Knies Jr.**, RN, MSN, CEN, clinical nurse specialist for emergency services at HealthSystem Minnesota in St. Louis Park. Other symptoms to watch for: anxiety, irritability, memory problems, and anorexia.

Commonly prescribed SSRIs include:

• fluoxetine, or Prozac (Eli Lilly and Co., Indianapolis);

• fluevoxamine, or Luvox (Solvay Pharmaceuticals, Marietta, GA);

• paroxetine or Paxil (SmithKline Beecham, Philadelphia);

• sertraline or Zoloft (Pfizer, New York City).

Those psychotropic medications need to be discontinued gradually, and a "time-off" period is needed before a new drug is started, says Knies.

The older tricyclic antidepressants were well-known for their anticholinergic, sedative, and orthostatic hypotensive side effects, says **Clyde Miyagawa**, PharmD, clinical pharmacy specialist in critical care at University Hospital in Cincinnati.

"These agents were relatively effective, but compliance was poor, secondary to their side effect profile," he explains. "This class of agents has been all but abandoned in favor of the newer SSRIs."

In general, SSRIs have minimal anticholinergic, sedative, and orthostatic hypotensive effects, notes Miyagawa. "However, insomnia, somnolence, nervousness, anxiety, nausea, diarrhea, headache, and tremor have been reported in 10% to 30% of patients taking these agents."[1]

Side effects fall into the following five groups: gastrointestinal and general somatic distress, sleep disturbances, disorders with motor abilities, behavioral irregularities, and various other side effects, such as cardiac arrhythmias.[2]

Symptoms may overlap and make the diagnosis difficult. Symptoms such as depressed mood, agitation, or irritability may be mistaken for a relapse of depressive symptoms, notes Knies.[3] Patients may get a reaction several days after they stop a medication. "With a lot of drugs, not only psychotropics, you need that lag period in between for the body to metabolize the drug."

Many drugs are fat soluble and take a long time to metabolize, he says. "It's well-documented in the *Physicians' Desk Reference* [published by Medical

Economics in Montvale, NJ] that you shouldn't stop one drug and start another one on the same day," Knies says.

Be proactive in identifying patients with discontinuation reactions by questioning them about specific medications, and then initiate supporting interventions, urges Knies. "Treat symptoms and restart SSRIs with subsequent gradual withdrawal."

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Here's the latest research on pediatric pain

Because pediatric patients are not in the same position as adult patients in terms of voicing concern for inadequate analgesia, they are particularly vulnerable to inadequate pain management, says **Arthur M. Pancioli**, MD, assistant professor for the department of Emergency Medicine at the University of Cincinnati College of Medicine. "Documenting the extent of a problem gives us a baseline from which to improve. In the case of pediatric analgesia, we have plenty of room for improvement."

Medical personnel should be more aggressive at identifying painful conditions, treating them quickly with adequate analgesics, and ensuring relief and adequacy of outpatient pain management, urges Pancioli.

Here are key findings of three recent studies that examined pediatric pain management in the ED:

1. Analgesic use in children differed in various ED settings. One study looked at analgesic use in children versus adults in three types of ED settings: an academic center with separate adult/pediatrics EDs; a community academic medical center with combined adult/pediatrics ED; and a community hospital with a combined ED.

Forty adult and 40 pediatric charts of patients presenting within 12 hours of an isolated long bone fracture were randomly selected for review at each of the institutions. The main findings were as follows:

— Overall, 63% of patients received some form of analgesia in the ED.

— The community ED offered less analgesia (51%) than the academic combined ED (73%), but not the separate ED (66%).

— Pediatric patients received significantly less analgesia than adults (53% vs. 73%). This difference was significant at the academic combined ED and the community ED, but not the separate ED.

— 81% of patients received discharge analgesia, with no difference between pediatric and adult patients. However, pediatric patients (27%) were more likely than adult patients (3%) to receive inadequate doses of analgesics on discharge.[1]

"The good news is that the use of analgesics appears to be increasing," reports **Emory Petrack**, MD, MPH, chief of the division of Pediatric Emergency Medicine at Rainbow Babies and Children's Hospital in Cleveland, and the study's principal investigator.[2]

Unfortunately, there continues to be a gap in the provision of adequate analgesia to children when compared with adults, notes Petrack. "Continued education and discussion regarding the need for good pain management in infants and children is essential if this gap is to be eliminated."

2. Protocols can improve management of painful conditions. One study conducted at Children's Hospital Medical Center of Cincinnati looked at ED management of three painful conditions: vasoocclusive crisis (VOC or

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sickle cell crisis), isolated lower extremity fractures less than 12 hours old, and second-degree burns less than 12 hours old. The findings were as follows:

— Frequency of use: VOC 100%, fracture 31%, burns 26%.

— Use of recommended initial dose: VOC 78%, fracture 69%, burn 79%.

— Mean time in minutes to initial dose: VOC 52%, fracture 86%, burn 29%.

— Notation of pain relief in the chart:VOC 88%, fracture 19%, burn 29%.

— Instructions for home analgesic use: VOC 100%, fracture 74%, burn 27%.

Analgesics use was suboptimal in terms of frequency for burns and fractures, initial dosing was often below recommended initial doses, delays were relatively long for initial dosing, and too little documentation of pain relief and instructions for home pain control was found, says Pancioli, one of the study's investigators.

"It was very interesting to us that the best pain management occurred with VOC where there are protocols for managing this type of pain," he reports. "It may be that similar protocols would substantially improve pain management for other conditions."

3. Parent's perception of children's pain management improves with staff education. Often, parents feel that their child's pain management is inadequate. "Parents want relief for their child's pain, but research has shown satisfaction rates as low as 33%," says **Lisa Chan**, MD, FACEP, assistant residency director at the department of emergency medicine at the University of Arizona in Tucson and the principal investigator for a study on parents' perception of their child's pain management.[3]

In a study on satisfaction of parents, charts were pulled for children who came to the ED with six painful diagnoses.[4] "We telephoned the parent a week after the child was discharged and asked if they thought the pain was controlled adequately," says Chan.

Satisfaction rates were 91%, which the researchers attribute to quarterly inservicing for ED staff that results in better pain management.

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CE objectives

After reading this issue of *ED Nursing*, the CE participant should be able to:

1. Identify clinical, regulatory, or social issues relating to ED nursing. (See in this issue: *Follow new rabies guidelines, or you may overuse or misuse vaccines*; *What to expect when SSRIs are discontinued;* and *Infectious disease update: What you'll see this winter.)*

2. Describe how those issues affect nursing service delivery.

3. Cite practical solutions to problems and integrate information into the ED nurse's daily practices, according to advice from nationally recognized experts. (See *Cutting-edge protocol available for vaccines.)* ■

Human Rabies Prevention — United States, 1999 Recommendations of the Advisory Committee on Immunization Practices (Excerpt)

These revised recommendations of the Advisory Committee on Immunization Practices update the previous recommendations on rabies prevention *(MMWR* 1991; 40:1-14) to reflect the current status of rabies and anti-rabies biologics in the United States.

This report includes new information about a human rabies vaccine approved for U.S. use in 1997, recommendations regarding exposure to bats, recommendations regarding an observation period for domestic ferrets, and changes in the local administration of rabies immune globulin.

Rabies is a viral infection transmitted in the saliva of infected mammals. The virus enters the central nervous system of the host, causing an encephalomyelitis that is almost always fatal. After the marked decrease of rabies cases among domestic animals in the United States in the 1940s and 1950s, indigenously acquired rabies among humans decreased substantially.

In 1950, for example, 4,979 cases of rabies were reported among dogs, and 18 cases were reported among humans. Between 1980 and 1997, 95-247 cases were reported each year among dogs, and only two human cases were reported in which rabies was attributable to variants of the virus associated with indigenous dogs. Thus, the likelihood of human exposure to a rabid domestic animal in the United States has decreased greatly. However, during the same period, 12 cases of human rabies were attributed to variants of the rabies virus associated with dogs from outside the United States. Therefore, international travelers to areas where canine rabies is still endemic have an increased risk of exposure to rabies.

Although rabies among humans is rare in the United States, every year approximately 16,000 to 39,000 persons receive post-exposure prophylaxis. To appropriately manage potential human exposures to rabies, the risk of infection must be accurately assessed. Administration of rabies post-exposure prophylaxis is a medical urgency, not a medical emergency, but decisions must not be delayed. Systemic prophylactic treatments occasionally are complicated by adverse reactions, but those reactions are rarely severe.

Data on the safety, immunogenicity, and efficacy of active and passive rabies immunization have come from both human and animal studies. Although controlled human trials have not been performed, extensive field experience from many areas of the world indicates that post-exposure prophylaxis combining wound treatment, passive immunization, and vaccination is uniformly effective when appropriately applied. However, rabies has occasionally developed among humans when key elements of the rabies post-exposure prophylaxis regimens were omitted or incorrectly administered.

Vaccines Licensed for Use in the United States

Four formulations of three inactivated rabies vaccines are currently licensed for pre-exposure and post-exposure prophylaxis in the United States. When used as indicated, all three types of rabies vaccines are considered equally safe and efficacious. The potency of one dose is greater than or equal to 2.5 international units (IU) per 1.0 mL of rabies virus antigen, which is the World Health Organization's recommended standard.

A full 1.0-mL dose can be used for both pre-exposure and post-exposure prophylaxis. However, only the Imovax Rabies I.D. vaccine (human diploid cell vaccine [HDCV]) has been evaluated and approved by the Food and Drug Administration (FDA) for the intradermal dose and route for pre-exposure vaccination. Therefore, rabies vaccine adsorbed (RVA) and purified chick embryo cell vaccine (PCEC) should not be used intradermally. Usually, an immunization series is initiated and completed with one vaccine product. No clinical studies have been conducted that document a change in efficacy or the frequency of adverse reactions when the series is completed with a second vaccine product.

Human Diploid Cell Vaccine (HDCV)

HDCV is prepared from the Pitman-Moore strain of rabies virus grown on MRC-5 human diploid cell culture, concentrated by ultrafiltration, and inactivated with beta-propiolactone. It is supplied in two forms:

- Intramuscular (IM) administration, a single-dose vial containing lyophilized vaccine that is reconstituted in the vial with the accompanying diluent to a final volume of 1.0 mL just before administration.
- Intradermal (ID) administration, a single-dose syringe containing lyophilized vaccine that is reconstituted in the syringe to a final volume of 0.1 mL just before administration.

Rabies Vaccine Adsorbed (RVA)

RVA was developed and is currently manufactured and distributed in the state of Michigan by BioPort Corp. The vaccine is prepared from the Kissling strain of Challenge Virus Standard (CVS) rabies virus adapted to fetal rhesus lung diploid cell culture. The vaccine virus is inactivated with betapropiolactone and concentrated by adsorption to aluminum phosphate. Because RVA is adsorbed to aluminum phosphate, it is liquid rather than lyophilized. It is approved for IM administration only as a 1.0-mL dose.

Purified Chick Embryo Cell Vaccine (PCEC)

PCEC became available in the United States in autumn 1997. It is prepared from the fixed rabies virus strain Flury LEP grown in primary cultures of chicken fibroblasts. The virus is inactivated with betapropiolactone and further processed by zonal centrifugation in a sucrose density gradient. It is formulated for IM administration only. PCEC is available in a single-dose vial-lyophilized vaccine that is reconstituted in the vial with the accompanying diluent to a final volume of 1.0 mL just before administration.

Rabies Immune Globulin Licensed for Use in the United States

The two RIG products, BayRab™ and Imogam Rabies-HT, are an anti-rabies immunoglobulin (Ig) preparation concentrated by cold ethanol fractionation from plasma of hyperimmunized human donors. Rabies neutralizing antibody, standardized at a concentration of 150 IU per mL, is supplied in 2-mL (300 IU) vials for pediatric use and 10-mL (1,500 IU) vials for adult use; the recommended dose is 20 IU/kg body weight. Both RIG preparations are considered equally efficacious when used as described in this report.

POST-EXPOSURE PROPHYLAXIS

Rationale for Treatment

Administration of rabies post-exposure prophylaxis is a medical urgency, not a medical emergency. Physicians should evaluate each possible exposure to rabies, and if necessary, consult with local or state public health officials regarding the need for rabies prophylaxis. In the United States, certain factors should be considered before specific anti-rabies post-exposure prophylaxis is initiated. **(See chart, below.)**

Types of Exposure

Rabies is transmitted only when the virus is introduced into bite wounds or open cuts in skin or onto mucous membranes. If no exposure has occurred (i.e., no bite or nonbite exposure), post-exposure prophylaxis is not necessary. The likelihood of

Rabies Post-exposure Prophylaxis Guide, United States, 1999

Animal Type	Evaluation and Disposition of Animal	Post-exposure Prophylaxis Recommendations
Dogs, cats, and ferrets	Healthy and available	Should not begin prophylaxis for 10 days observation unless animal develops clinical signs of rabies*
	Rabid or suspected rabid	Immediately vaccinate
	Unknown (e.g., escaped)	Consult public health officials
Skunks, raccoons, foxes, and most other carnivores; bats	Regarded as rabid unless animal proven negative by laboratory tests+	Consider immediate vaccination
Livestock, small rodents, lagomorphs (rabbits and hares) large rodents (woodchucks and beavers), and other mammals	Consider individually	Consult public health officials. Bites of squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, other small rodents, rabbits, and hares almost never require anti-rabies post-exposure prophylaxis.

* During the 10-day observation period, begin post-exposure prophylaxis at first sign of rabies in a dog, cat, or ferret that has bitten someone. If the animal exhibits clinical signs of rabies, it should be euthanized immediately and tested.

+ The animal should be euthanized and tested as soon as possible. Holding for observation is not recommended. Discontinue vaccine if immunofluorescence test results of the animal are negative.

rabies infection varies with the nature and extent of exposure. Two categories of exposure — bite and nonbite — should be considered.

• Bite. Any penetration of the skin by teeth constitutes a bite exposure. All bites, regardless of location, represent a potential risk of rabies transmission. Bites by some animals, such as bats, can inflict minor injury and thus be undetected.

• Nonbite. Nonbite exposures from terrestrial animals rarely cause rabies. However, occasional reports of transmission by nonbite exposure suggest that such exposures constitute sufficient reason to consider post-exposure prophylaxis. The nonbite exposures of highest risk appear to be among persons exposed to large amounts of aerosolized rabies virus and surgical recipients of corneas transplanted from patients who died of rabies. Two cases of rabies have been attributed to probable aerosol exposures in laboratories, and two cases of rabies have been attributed to possible airborne exposures in caves containing millions of free-tailed bats (Tadarida brasiliensis) in the Southwest.

The contamination of open wounds, abrasions, mucous membranes, or theoretically, scratches, with saliva or other potentially infectious material (such as neural tissue) from a rabid animal also constitutes a nonbite exposure. Other contact by itself, such as petting a rabid animal and contact with blood, urine, or feces (e.g., guano) of a rabid animal, does not constitute an exposure and is not an indication for prophylaxis. Because the rabies virus is inactivated by desiccation and ultraviolet irradiation in general; if the material containing the virus is dry, the virus can be considered noninfectious.

Source: Centers for Disease Control and Prevention. Human Rabies Prevention — United States, 1999. Recommendations of the Advisory Committee on Immunization Practices. *MMWR* 1999; 48:1-21.