

# KEEPING EVERYONE HEALTHY AT SCHOOL

## PREVENTION— THE BEST TREATMENT

### PART II

**B**esides the diseases and illnesses discussed in Part I of this article, a number of others can pose a real threat to students and others at school, causing unnecessary pain and suffering, as well as absences. Some are highly infectious (contagious), and others, although not as easily contracted, can still be transmitted at school.

Part I discussed diseases spread through the air and through direct contact with sick people. Illnesses are spread by other means in the school environment, as well. Part II will discuss those spread by ingesting contaminated food and/or water, as well as those transmitted by insects and other vectors. The information provided will help teachers and other school personnel recognize conditions that are likely to foster the spread of these diseases, determine which symptoms need immediate attention and medical evaluation, and take steps to keep everyone healthy and disease-free throughout the school year.

#### Infectious Disease Indicators

Since teachers spend many hours each day with students, they are in an excellent position to detect early physical and/or behavioral changes that may indicate an illness or infection, and thus prevent its spread. School

***Since teachers spend many hours each day with students, they are in an excellent position to detect early physical and/or behavioral changes that may indicate an illness or infection, and thus prevent its spread.***

nurses, principals, secretaries, and other school personnel can also help to identify early signs of illness in the school environment.

Certain symptoms of infectious diseases can serve as red flags for medical evaluation and medical care. These include changes in appetite, behavior, skin, eye color, and bowel habits (including abdominal pain), a fever, rash, sore throat, cough, earache, nasal discharge, and congestion (see Figure 1 on page 40).

Schools need to have well-defined, written policies to deal with student illness and injury. These must include parental-consent forms that allow the school to administer prescription and over-the-counter medications and obtain

emergency care for students under 18 years of age. However, even with parental consent, staff members should not give children aspirin for viral illnesses because of the possible association with Reyes syndrome, which can affect many organs of the body (the brain is particularly vulnerable).<sup>1</sup>

#### Infectious Diarrhea

Diarrhea can spread quickly if not detected and contained early. If a school, day-care center, or dormitory has a diarrhea outbreak, the local health department should be contacted while waiting for confirmation of the cause.<sup>2</sup>

The typical symptoms of intestinal

BY R. PATTI HERRING

Picture Removed

infections include diarrhea, abdominal pain, nausea, vomiting, and fever, which may be caused by viruses, bacteria, parasites, or intestinal worms. The severity of the symptoms depends on the cause and vitality of the person's immune system. The most common mode of transmission is fecal-oral contamination (transfer of germs from feces to the mouth by unwashed hands or ingestion of contaminated food or water). People can also contract a number of diarrheal infections by swimming in contaminated swimming pools, lakes, and rivers.<sup>3</sup>

Any student with persistent diarrhea, especially if it is accompanied by fever and cramps, should be seen by a health-care provider as soon as possible.

### **Recommendations for Preventing the Spread of Food- and Water-Borne Infections**

1. Report without delay to the local health department any clusters of diarrheal infections and suspected food- and water-borne illnesses. Work with them to identify the cause(s) and to prevent recurrences. This will require keeping careful records to determine whether there is a common source of infection, such as the swimming pool

or river, the dining hall, a particular classroom or locker room, etc., where outbreaks occurred within a specific time period.<sup>4</sup>

2. Students and employees should be encouraged to stay home if they are feeling ill or suffering from diarrhea; or when the local health department or physician advises.

3. Food handlers and child-care workers should be instructed not to come to school if they have any type of diarrheal illness or open skin lesions or sores. Once infected, they should be cleared by a licensed health-care provider before returning to work.

4. Students and staff with diarrhea should not use the swimming pool.<sup>5</sup>

5. Make sure water used for drinking and food preparation is treated with chemicals or boiled. Do not serve ice that has been made with untreated water.

6. Conduct regular inspections to ensure that temperatures are maintained within acceptable ranges for refrigerators (less than 40° F/60° C) and hot-food serving areas (greater than 140° F/ 60° C). Make sure that the internal temperature of cooked foods containing eggs, milk, and meat products reaches at least 185° F (85° C) before serving. Do not store or transport

perishable foods at room temperature for more than a few minutes, especially in hot weather. Store foods in clean, sealed containers.<sup>6</sup>

7. Do not serve unpasteurized milk, or eggs, meat, and seafood that have not been thoroughly cooked. Be alert to possible contamination of leafy vegetables, sprouts, and juices.

8. Avoid cross-contamination when preparing food. This can occur when the juices of eggs and meats (i.e., chicken, turkey, fish, etc.) touch other foods, cutting boards, and countertops on which other foods are prepared.<sup>7</sup> Clean food-preparation surfaces frequently with disinfectants.

9. If a commercial dishwasher is available, make sure that the water temperature is at least 170-180° F (70-75° C).<sup>8</sup> If dishes and eating utensils must be washed by hand, first scrub off remaining food using hot water and soap, then soak in a solution of one tablespoon chloride bleach per gallon of water. Drain and air dry.

10. To control flies and insects, install screens on windows and doors; spray as needed with insecticides; keep trash and composting areas away from buildings.

11. Instruct students, teachers, and other school employees and volunteers to practice proper hand-washing techniques after using the bathroom, before eating, after changing diapers, and before handling food. Post signs as reminders in various places throughout the school (bathrooms, kitchens and cafeterias, diaper-changing areas, dormitories, etc.). Provide adequate tools and agents (i.e., antibacterial soap and alcohol wipes, waste disposal containers, etc.) in the bathrooms and other areas throughout the school. Provide parents/guardians with hand-washing resources via take-home fliers.

12. Diaper-changing stations/surfaces should be disinfected after each diaper change. Toilets and sinks should be cleaned and disinfected daily. Surfaces should be cleaned and disinfected

Figure 1

## Common Indicators of Infectious Diseases<sup>9</sup>

Signs and Symptoms of Infection	School's Responsibility	
<b>Changes in Appetite</b>	Student is picky about what he or she wants to eat, eats very little or not at all; may want only certain foods or prefer only liquids.	Observe the child to see if other symptoms occur.
<b>Changes in Behavior</b>	Irritability, drowsiness, or indifference, occurring with fever, fatigue, and pain	If accompanied by other symptoms, ask parent/guardian to take the child home and get a medical evaluation.
<b>Fever</b>	Low-grade fever: 99.5 – 102.2° F (38 - 39° C) High fever: 102.2° – 104° F (39 - 42° C)	Parent/guardian should be asked to take the child home if he or she has a fever higher than 100.4° F (38° C). Quarantine dormitory students with a high temperature until the cause has been diagnosed.  Give treatment (including medicine) only if parent/guardian has signed a permission form.  Do not give aspirin for viral illnesses because of the possible association with Reyes syndrome.
<b>Skin and Eye Color</b>	A noticeable change from the student's normal skin or eye color: the skin might look pale, ashy, colorless, or have a pasty glow; the cheeks may be flushed or rosy; the eyes may be yellow-tinged or red.	Observe the child to see if other symptoms occur.
<b>Rash</b>	A change in the skin's appearance or texture, which causes swelling and color changes, making it feel warm, dry, cracked, bumpy, blistered, and often painful.	Determine whether this is due to a contagious disease (chicken pox, measles, etc.); if so, isolate the child from other students until parent/guardian can take him or her home.  Ask parent/guardian to contact a physician for an evaluation.
<b>Changes in Bowel Habits/ Abdominal Pain/Vomiting</b>	The student makes frequent requests to go to the bathroom and complains of diarrhea, constipation, or severe stomach cramps.  The student is absent from school frequently because of abdominal pain or vomiting.	Severe diarrhea can quickly result in dehydration and even death.  Persistent, severe pain accompanied by vomiting, diarrhea, or constipation requires immediate medical attention.
<b>Nasal Discharge and Congestion</b>	Clear nasal discharge (runny nose and watery eyes) may indicate a cold or an allergic reaction.  Yellow or greenish discharge may indicate a serious infection.	If discharge is accompanied by sneezing and other cold/flu symptoms, ask parent/guardian to keep student home until he or she has recovered.
<b>Sore Throat</b>	Student has a raw, red throat and/or difficulty swallowing, and may have swollen glands in the neck.	If a fever accompanies these symptoms, the student should be sent home, and parent/guardian encouraged to get a medical evaluation, as it may indicate strep, mononucleosis (a viral infection spread by close contact), or another serious illness.
<b>Cough</b>	The student has a cough that lasts more than three weeks. Check whether accompanied by a loss of appetite, weight loss, or other symptoms.	Ask parent/guardian to get a medical evaluation, as this may indicate tuberculosis or another serious illness.
<b>Earache and Discharge From the Ear</b>	The student complains of pain in ear, pulls at ear, or holds hand to ear. There may be drainage (blood or pus) from the ear.	Ask parent/guardian to get an immediate medical evaluation.

using 1:100 bleach solution or a cleaning solution containing quaternary ammonium and/or HCL, an ingredient of many toilet cleaners.<sup>10</sup> Custodial staff should use latex gloves when cleaning bathrooms and handling trash.

### Other Food- and Water-Borne Diseases

Along with the diarrheal diseases described earlier, which are primarily transmitted through contaminated food and/or water, a few others should be mentioned. Food can be contaminated by viruses, bacteria, parasites, chemicals, poisonous plants, and other agents. Water-borne diseases can be contracted when contaminated water is ingested or used in preparing food.<sup>11</sup> Sometimes there is a fine line between whether a disease should be labeled food-borne or water-borne.

Consider the following scenario: Ms. Ortega,\* a school cafeteria worker, has contracted some type of diarrheal-type illness or infection. She goes to school as usual and prepares lunch without washing her hands properly, thus contaminating the food. Or Ms. Cho,\* a kindergarten teacher who has been infected with Hepatitis A but is not yet experiencing symptoms, goes to the bathroom. She doesn't wash her hands properly or clean under her fingernails before preparing a finger-snack for her class. In both cases, fecal-oral transmission is likely.

Transmission of food- and water-borne diseases is largely preventable, although the Centers for Disease Control and Prevention (CDC) warn that there is no sure simple one-step method for doing so. It recommends four major preventive measures, which should be included in the health curriculum: **boil it, cook it, peel it, or forget it.**<sup>12</sup>

Water used for drinking or cooking should be treated with chlorine or iodine, or boiled for at least one minute. If proper sewage and pure water are not available, people should avoid salads and eat only cooked vegetables and fruits or those they have peeled them-

## Schools need to have well-defined, written policies to deal with student illness and injury.

selves.<sup>13</sup> They should not eat food that might have been prepared, stored, or served under unsafe conditions or that they did not prepare themselves. Of course, at school, children cannot make these decisions. They must consume the food that is prepared for them by the cafeteria staff. Thus, it's the school's responsibility to ensure that the food is safe.

Besides the infections listed in the table above, Hepatitis A, cholera, and

Picture Removed

HAV can be contracted through contact with infected individuals in the home, school, dormitory, or other close quarters. The virus can also be spread when an infected person prepares uncooked food for human consumption. Someone infected with HAV is most likely to transmit the disease when the viral concentration in his or her stool is at the highest levels. From the time of exposure to the development of symptoms takes roughly 28 days, but the incubation period can range between 15 and 50 days, with the peak of the infection occurring during the two-week period before the onset of jaundice (yellowing of the skin and mucous membranes, including the eyes) and declining during the week after the on-



typhoid fever are severe but preventable food- and water-borne diseases that may pose health problems at school.

**Hepatitis A:** A liver disease caused by the Hepatitis A virus (HAV). In contrast with the Hepatitis B virus, which can be transmitted through blood and sexual contact, HAV is spread mostly through contaminated food and water. Once infected with HAV, individuals have lifetime immunity against it; whereas the Hepatitis B virus can cause long-term infections such as cirrhosis of the liver, cancer, liver failure, and even death. Hepatitis A is considered the only food-borne disease for which there is an effective vaccine.<sup>14</sup> In addition to the oral-fecal route (ingestion),

set of jaundice.<sup>15</sup> Even if an infected person has no symptoms, he or she can transmit the disease.

**Symptoms** usually have an abrupt onset and include loss of appetite, weakness, fever, nausea, abdominal pain, fatigue, and jaundice. Children under the age of 6 are usually asymptomatic (without symptoms), whereas older children and adults are symptomatic (have symptoms) for the disease.<sup>16</sup>

**Prevention and treatment:** In areas where there are high rates of infection, vaccination and clean water will help prevent the spread of HAV. A vaccine series provides immunity for up to 20 years.<sup>17</sup>

\*Not their real names.

Figure 2

## Diarrheal Infections Common to the School Site<sup>18</sup>

Organism	Symptoms	Incubation & Spread	Infectious Period & Duration	Control Measures/ Treatment
<b>Campylobacteriosis</b>	Diarrhea, fever, abdominal pain, nausea, vomiting	<b>Incubation:</b> 3-5 days, with a range of 1-10 days  <b>Spread:</b> By contaminated food, impure water, and unpasteurized milk; contact with infected persons and pets	<b>Infectious Period:</b> Throughout the course of the infection if not treated with antibiotics for two to seven weeks  <b>Duration:</b> Variable (days to several weeks)	<b>Report to local health department within one day.</b> Students and staff should not attend school if they have symptoms.  <b>Treatment:</b> Antibiotics
<b>Giardiasis</b>  Caused by protozoan parasites	Often no symptoms; but may cause persistent diarrhea, abdominal cramps, bloating, frequent loose, pale, and greasy stools, fatigue, and weight loss	<b>Incubation:</b> 5-25 days or longer; 7-10 days average  <b>Spread:</b> person-to-person, fecal-oral route, ingestion of contaminated food or water	<b>Infectious Period:</b> Entire period of infection, which may be without symptoms  <b>Duration:</b> Variable (several weeks to several months)	<b>Report to local health department within three days.</b> Students and staff should not attend school if they have symptoms.  <b>Treatment:</b> Infection will usually go away by itself, but severe cases may require antiprotozoal medications.
<b>Salmonella</b>	Sudden onset of headache, nausea, abdominal pain, diarrhea, may have blood or pus in the stool, sometimes vomiting and fever. Dehydration can occur, especially among infants, and may be severe.	<b>Incubation:</b> 6-72 hours; usually 12-36 hours  <b>Spread:</b> By ingestion of contaminated water, undercooked or improperly stored foods; preparation of food on contaminated surfaces; contact with infected animals or an infected person's feces.	<b>Infectious Period:</b> During entire period of infection (usually 1-4 weeks)  <b>Duration:</b> Several days to several weeks	<b>Report to local health department within one day.</b> Students and staff should not attend school if they have symptoms.  <b>Treatment:</b> Infection will usually go away by itself, but the person should drink plenty of liquids to prevent dehydration.
<b>Shigellosis</b>	Diarrhea, fever, nausea, abdominal cramps and vomiting, may have blood or pus in the stool	<b>Incubation:</b> 12-96 hours (usually 1-3 days), occasionally up to one week  <b>Spread:</b> Person-to-person by direct or indirect transmission through dirty hands or fingernails after bathroom use. Flies may transfer the organism to uncovered food.	<b>Infectious Period:</b> Entire time organism is in the stool (usually 1-4 weeks)  <b>Duration:</b> Several days to several weeks	<b>Report to local health department within one day.</b> Students and staff should not attend school if they have symptoms.  <b>Treatment:</b> Antibiotics, replacing fluids to prevent dehydration
<b>E. coli</b>	Does not always produce symptoms, but often causes diarrhea and abdominal cramps. Person may have blood or pus in the stool.	<b>Incubation:</b> 1-9 days; usually 3-4 days  <b>Spread:</b> Person-to-person by direct or indirect transmission through dirty hands and fingernails after bathroom use; in agriculture, by contaminated lettuce, green onions, spinach, alfalfa sprouts, or juices; organism may be transferred during food preparation to food and food surfaces	<b>Infectious Period:</b> Entire period of infection, which may be without symptoms  <b>Duration:</b> Several days to several weeks	<b>Report to local health department within one day.</b> Students and staff should not attend school if they have symptoms.  <b>Treatment:</b> Infection will usually go away by itself, but the person should drink plenty of liquids to prevent dehydration.

*Continued on page 43*



Since HAV is transmitted by the fecal-oral route, hand washing is also an important preventive measure.<sup>19</sup> If a food handler contracts the disease, he or she should not be allowed to return to work for at least two weeks. Food handlers whose family members are infected with HAV should be tested before being allowed to prepare food at school.

Although hospitalization may be required for diagnosis and managing the symptoms, no specific treatment has proved effective for Hepatitis A.<sup>20</sup> Children should be excluded from school on a case-by-case basis.<sup>21</sup>

**Cholera:** A diarrheal disease contracted from ingesting water or food contaminated by the bacteria *Vibrio cholera*, which produces toxins in the body. Left untreated, cholera can cause dehydration and loss of electrolytes (sodium, potassium, calcium, etc.). In severe cases, death can occur. **Symptoms** include painless and profuse, watery diarrhea and occasionally vomiting and leg cramps. **Prevention:** Same as for other food- and water-borne diseases.<sup>22</sup>

The primary **treatment** for cholera

## The typical symptoms of intestinal infections include diarrhea, abdominal pain, nausea, vomiting, and fever, which may be caused by viruses, bacteria, parasites, or intestinal worms.

is replacing lost fluids with Gatorade-like sports drinks or replacement salts and large volumes of boiled or bottled water. In severe cases, victims need immediate medical attention.

**Typhoid fever:** A life-threatening disease that affects about 21.5 million people each year. This disease is spread when an infected person prepares food or beverages for others without washing his hands after using the bathroom. The *salmonella typhi* bacteria can also get into the water supply.<sup>23</sup>

**Symptoms** can include a fever as high as 103° to 104° F (39° to 40° C), weakness, stomach pain, headache, and loss of appetite. Some individuals

may experience a flat, rose-colored rash. The only sure diagnosis is through testing of stool or blood samples.<sup>24</sup>

**Prevention and treatment:** CDC's motto again is applicable: "Boil it, cook it, peel it, or forget it." Individuals with this disease should not prepare food for other individuals or care for small children. A medical clearance is mandatory before infected children or other school personnel are allowed to return to the classroom or workplace. Even asymptomatic infected persons can spread the disease. The vaccine for typhoid is not completely effective, but the disease is treatable with antibiotics.<sup>25</sup>

In summary, food- and water-borne diseases can be debilitating and potentially deadly. Depending on the cause (virus, bacteria, or parasite), the incubation period varies. Infected persons should not attend school or handle food. According to experts, the single most important thing people can do is to wash their hands to keep from contracting or transmitting infectious diseases and illnesses.<sup>26</sup>

If the school gets its water from a

Figure 2 Continued

### Diarrheal Infections Common to the School Site

Organism	Symptoms	Incubation & Spread	Infectious Period & Duration	Control Measures/Treatment
<b>Viral Gastroenteritis (stomach flu)</b>	Low-grade fever, diarrhea, vomiting, abdominal cramps, body aches, headache	<b>Incubation:</b> 24-72 hours <b>Spread:</b> Person-to-person by direct or indirect transmission through dirty hands and fingernails after bathroom use	<b>Infectious Period:</b> During the illness and shortly afterwards <b>Duration:</b> 1-2 days	<b>No need to report to health department.</b> Students and staff should not attend school if they have symptoms. <b>Treatment:</b> Infection will usually go away by itself, but the person should drink plenty of liquids to prevent dehydration. Antibiotics may make symptoms worse.
<b>Yersiniosis bacteria</b>	Headache, acute, watery diarrhea (especially in young children) fever, vomiting, anorexia, pharyngitis	<b>Incubation:</b> 3-7 days; generally under 10 days <b>Spread:</b> By eating and drinking contaminated food and/or water; contact with infected persons or animals	<b>Infectious Period:</b> At least as long as symptoms persist; if untreated, organism can be excreted for 2-3 weeks. <b>Duration:</b> 2-3 weeks	<b>Report to local health department within one day.</b> Students and staff should not attend school if they have symptoms. <b>Treatment:</b> Antibiotics

lake, stream, well, or cistern, or uses untreated water from the local town's pumping station, the water should be tested regularly and treated with chlorine. Commercial filters can also remove algae, fungi, minerals, and chemical pollutants that make untreated water unsafe to drink.<sup>27</sup> If the school budget does not allow for the purchase of a commercial filter, the water can be boiled. At sea level, the water should be boiled for at least one minute (three minutes or more at higher altitudes). If impurities are identified by testing, the water should be boiled for at least 10 minutes to remove germs, bacteria, and other harmful pollutants. It is better to over-boil (longer than 10 minutes) than to under-boil the water. Once it cools, it is safe to drink. Keep in mind, however, that boiling and chlorination will not remove dangerous metals (aluminum, lead, cadmium, arsenic, and mercury), salts, or most chemicals. This requires filters or distillation.

### The School's Responsibility

Each school must establish policies that ensure the safety of food and water. In many countries, public health regulatory agencies monitor and regulate the handling and preparation of food at schools. Most school cafeterias must adhere to state and county regulations. However, administrators shouldn't assume that people know how to prevent the spread of dangerous diseases. Policies relating to these matters should be printed and distributed to teachers and staff. Compliance should be monitored regularly.<sup>28</sup> Teachers and classroom aides should keep their eyes open for potential threats to environmental school safety.

### Insect-Borne Diseases and Other Communicable Conditions

Scabies and lice (head and body) are common preventable problems at school, along with ringworm and pinworms.

**Scabies:** A severe skin infection caused by the mite *Sarcoptes scabiei*. Scabies can affect people from any socioeconomic status regardless of age, sex, or race, although it is more com-

mon when people live in crowded conditions or practice poor hygiene. Even casual contact with a person with mites can allow their spread. Mites can survive three to four days away from human skin. Occasionally, scabies is spread by contact with the contaminated bed linens of an infected person or with bath towels used for showers after gym class or after swimming. Scabies can be transmitted as long as a person remains untreated.<sup>29</sup>

**Symptoms:** Symptoms can occur two to six weeks after first exposure, and re-infection can occur in one to four days.<sup>30</sup> The earliest sign of scabies is itching, usually at night. Little red bumps, resembling hives, tiny bites, or pimples, appear on the skin. The mites usually can be found in the webs between the fingers and toes as well as around the wrist and navel, the backs of the elbows, the folds of the armpits, beltline, and abdomen, in the creases of the groin, and on the genitals.<sup>31</sup>

**Treatment:** There are effective over-the-counter and prescription ointments, which usually must be applied to the skin from head to toe, and left on for at least 8-14 hours. For persistent cases, a second treatment is needed one week later. Since it is uncommon for only one member in a family to be infected, other residents in the home should be examined and treated. A medical clearance for the student and the family should be required before the student is allowed to return to school.<sup>32</sup>

**Lice:** A common contagious problem in school-aged children. There are three types: head, body, and pubic lice. **Head lice** are the most common and infect 6-12 million people in the U.S. each year. **Body lice** are more often a problem in underdeveloped countries, but are also problematic for homeless people in the U.S. **Pubic lice** are usually transmitted by sexual contact. The life cycle for lice is up to 30 days, but they do not generally survive for more than 24 hours off the human body.<sup>33</sup>

Some body lice can transmit diseases such as typhus, trench fever, and relapsing fever; but for the most part, head and body lice are more uncom-

fortable than dangerous.<sup>34</sup> Since the louse's eggs hatch within one week and reach sexual maturity 8-10 days later, they can multiply swiftly. Lice are spread by contact with infected individuals and their personal belongings (like clothing and head gear).<sup>35</sup>

**Symptoms:** Itching of the scalp or the body where the eggs hatched, and small grey nits (eggs) or insects at the base of hair follicles.<sup>36</sup>

**Treatment:** The spread of lice can be prevented by instructing students to avoid head-to-head contact with their

### Tips for a Safer School Environment

1. Develop comprehensive policies relating to illness and vaccination. Notify parents/guardians in writing to keep their children home from school when they are sick.

2. Students' vaccinations should be kept up to date; non-compliant students should not be permitted to attend school. Vaccines guard students—and others in the school environment—against a number of dangerous infectious diseases.

3. Don't allow children to share utensils or personal items like cups, glasses, forks and spoons, or combs, toothbrushes, hats, underwear, etc.

4. Instruct children to wash their hands after going to the bathroom, before eating, and after blowing their nose. Encourage them to sing the "happy birthday" song or the "ABC" song to ensure that they have scrubbed for at least 10-15 seconds.

5. Refer students to the school nurse when they are sick. He or she should do a medical evaluation and notify the parent/guardian to pick the student up from school. Children with infectious diseases should be quarantined.

6. Teach students about good health habits, including proper diet and adequate sleep (at least eight hours every day), in order to keep their immune system healthy.

classmates while in class and at play. Items such as combs, brushes, barrettes, ribbons, towels, and hats should not be shared or stored together. Students should not lie on other people's bedding, pillows, or carpet.<sup>37</sup> Carpeting and upholstered furniture will need to be vacuumed to remove the lice. There are over-the-counter and prescription chemicals that can kill lice.

**Parasites:** Organisms that use a host organism's tissues or blood for their own nutritional benefit. They can infect humans from all walks of life, poor and rich, in all parts of the world. A number of parasites are spread through human carelessness, poor hygiene, and unsanitary conditions. The roundworm family is the most problematic as well as the most common parasite that affects humans. Some of the most common roundworms include the pinworm, the large intestinal roundworm, the hookworm, the whipworm, and *trichinella spiralis* (found in undercooked pork). The best treatment is prevention—pure water, thorough cooking of food, and good hygiene. Several types of parasites, including pinworms, can be spread by pets, articles of clothing, bedding, food, and dust, and can survive outside the human body for a period of time.

**Treatment:** Most respond well to drugs, although measures need to be taken to avoid re-infestation. In severe cases, the physician may prescribe iron supplements to prevent anemia.<sup>38</sup>

**Ringworm:** Despite its name, ringworm is caused by various types of fungi. It can infect the body in general, the scalp, the groin, or the feet (athlete's foot). It appears as small red patches or bumps on the skin that spread outward, forming a red, scaly ring whose inside appears clear. It can be spread directly by contact with infectious individuals or animals, or indirectly by contact with surfaces or articles on which the fungus lingers (e.g., hats, bedding, shower caps, etc.). It is not necessary to report it to the local health department.

**Treatment:** Infected students should be referred to their health-care provider for treatment, which is very

effective.<sup>39</sup> Surfaces and articles should be washed thoroughly with disinfectant solutions. Articles that cannot be washed and disinfected (e.g., shower caps) should not be reused.

**It is the school's responsibility to ensure that these conditions are not spread to others.** Infected children should be excluded from the classroom and school-related activities until the day after the appropriate treatment has started. They should be under the care of a physician or school nurse for and during treatment. Only when the health-care provider has deemed the student and other household members non-infectious should the student be permitted to return to school. All students in infested classrooms should be inspected, and the same protocol applied to them and their families.<sup>40</sup> Dressing areas, showers, sports equipment (floor mats, exercise equipment, etc.) should be carefully disinfected and cleaned daily. Towels and other shared items should be laundered and sanitized.<sup>41</sup>

### Other Insect-Borne Diseases

Several other insect-borne viral diseases can pose a threat at school. Lyme disease is caused by a bite of a bacteria-infected tick, while malaria, West Nile Virus, and yellow fever are transmitted by infected mosquitoes.

**Lyme Disease:** A potentially serious disease spread by infected ticks. An early sign is a circular rash, which can increase in size to 12 inches in diameter over a period of 3-30 days. Other **symptoms** include fatigue, chills, headache, and swollen lymph nodes. **Prevention:** Avoid being bitten by using insect repellent, and remove ticks from skin, clothing, and landscaping. In most cases, Lyme disease can be successfully treated with antibiotics, particularly if treatment is started early. In a small number of cases, symptoms (muscle and joint pain, fatigue, cognitive problems, sleep disturbances, and arthritis) persist even after treatment.<sup>42</sup>

**Malaria:** A serious and sometimes fatal disease caused by a parasite transmitted by the bite of an infected female *Anopheles* mosquito.<sup>43</sup> The disease is

prevalent in tropical and subtropical regions of the world. The World Health Organization (WHO) estimates that there are 300-500 million cases of malaria each year, and more than one million deaths. **Symptoms:** Similar to flu (chills, high fever, shaking, headache, nausea, vomiting, and diarrhea). Some individuals may experience muscle aches and tiredness. Because of the loss of red blood cells, malaria may cause anemia and jaundice. **Protection:** Eliminate pools of water where mosquitoes can breed, spray insecticides on the walls of buildings to kill adult mosquitoes, wear long sleeves and long trousers at night, use insect repellent, install screens on windows and doors, and sleep under insecticide-treated bed nets. **Treatment:** Early diagnosis is important, combined with anti-malarial drugs that can destroy the parasite and prevent reoccurrence. There is currently no vaccine available for malaria.<sup>44</sup>

**West Nile Virus (WNV):** A potentially serious illness transmitted by the bite of a mosquito infected with flavivirus, which occurs in many parts of the world.<sup>45</sup> Diseases caused by the West Nile virus include encephalitis, meningitis or meningoencephalitis, and West Nile fever.<sup>46</sup> The West Nile fever can cause mild to severe **symptoms** ranging from headache, body aches, a skin rash on chest, stomach, and back, nausea, vomiting, and swollen lymph glands to high fever, headache, muscle weakness, vision loss, neck stiffness, disorientation, coma, convulsions, and paralysis. However, about 80 percent of those infected do not experience any symptoms.<sup>47</sup>

**Prevention:** The same as for malaria—reduce the risk of mosquito bites. There is no **treatment** for WNV. People with severe cases should seek medical attention immediately to prevent disability and even death. In milder cases, the illness improves on its own.<sup>48</sup> Victims should get plenty of rest, drink lots of water, and seek medical care if symptoms get worse.

**Yellow Fever:** Another disease transmitted to humans by infected mosquitoes, which occurs only in trop-



ical South America and sub-Saharan Africa. It gets its name from the yellowing of the skin and eyes caused by the virus.<sup>49</sup> Yellow fever infections are usually mild, but they can cause severe life-threatening side-effects. Although there are two types, intermediate or urban yellow fever, which is spread by the *aedes aegypti* mosquito, causes most cases of yellow fever in humans.<sup>50</sup> This mosquito breeds in discarded tires, water storage containers, flower pots, and oil drums.<sup>51</sup>

**Symptoms:** High fever, chills, muscle aches, backache, headache, and vomiting commence three to six days after being bitten by the mosquito. After a short recovery, some individuals experience reoccurring symptoms like bleeding, shock, and kidney or liver failure.<sup>52</sup> **Prevention:** Take the same precautions as for malaria and West Nile virus. The best prevention, however, is vaccination. **Treatment:** Infected individuals are encouraged to rest, drink plenty of fluids, and avoid exposure to mosquitoes.<sup>53</sup>

### School Policy

"It is clear that, in addition to deciding whether a student should attend school, the administrator or his/her designee must also evaluate whether the disease has implications for the student's participation in such activities as physical education, athletics, field trips, and lunchroom work. For example, the student who may possibly infect others with a disease that can be spread via droplets, fecal-oral contamination, or sores on the skin should not work in food services until approved to do so by the school nurse, licensed health-care provider, or public health official. At the same time, good personal hygiene such as washing hands after using the bathroom and before handling food must be emphasized. In addition to proper hand washing techniques, it is required that food handlers, where practical, wear single-service gloves."<sup>54</sup>

### Conclusion

Schools have a moral responsibility to keep their students well. The best way to prevent infectious diseases is to

practice good hygiene, particularly hand washing (see Part I for more information).✍



**R. Patti Herring, Ph.D., R.N.,** is an Associate Professor at the School of Public Health, Dept. of Health Promotion and Education at Loma Linda University in Loma Linda,

California. She is also co-investigator for the Adventist Health Study-2.

For further information about immunizations and their role in preventing communicable diseases, download and read "Important Facts Regarding Immunizations" from the February/March 2003 issue of this journal on the Web (<http://circle.adventist.org/browse/resource.phtml?leaf=4445>).

This series of articles has been read and approved by the Health Ministries Department of the General Conference of Seventh-day Adventists.

The information in this series represents the best of current research as compiled by the authors and verified by the JOURNAL'S copy editor. However, with the passage of time, new information and recommendations may emerge. Readers should consult a health professional for information specific to their personal health status and medical history, and for recommendations relating to public health issues in Adventist schools. It is always prudent to get more than one opinion.

### Resources

#### Food and Drug Administration (FDA)

U.S. Department of Health and Human Services  
5600 Fishers Lane, CDER-HFD-240  
Rockville, MD 20857  
<http://www.fda.gov>  
Telephone: (301) 827-4573; 888-INFO-FDA (463-6332)

#### National Reye's Syndrome Foundation

P.O. Box 829  
426 North Lewis  
Bryan, OH 43506-0829  
[nrsf@reyessyndrome.org](mailto:nrsf@reyessyndrome.org)  
<http://www.reyessyndrome.org>  
Telephone: (419) 636-2679;  
1-800-233-7393  
Fax: (419) 636-9897

#### The Centers for Disease Control and Prevention

Traveler's International Information Telephone Line provides information on cholera and other diseases that affect travelers  
Telephone: 1-877-394-8747

#### Lyme Disease

For treatment guidelines developed by the Infectious Disease Society of America, visit [http://www.IDSA/Practice Guidelines for Treatment of Lyme Disease/PDF 120KB, 114 pages](http://www.IDSA/Practice%20Guidelines%20for%20Treatment%20of%20Lyme%20Disease/PDF%20120KB,114%20pages).

#### West Nile Virus

<http://www.cdc.gov/westnile> or call 1-800-232-6348

#### National Digestive Diseases Information Clearinghouse

2 Information Way  
Bethesda, MD 20892-3570  
Telephone: 1-800-891-5389  
Fax: (703) 738-4929  
E-mail: [nddic@info.niddk.nih.gov](mailto:nddic@info.niddk.nih.gov)

### NOTES AND REFERENCES

1. State of Washington Office of Superintendent of Public Instruction, Department of Health, "Infectious Disease Control Guide for School Staff," <http://www.K12.wa.us/healthservices/pubdocs/infectiousdiseasecontrolguide3-11-04.pdf> (April 2004), p. 6 (subsequently abbreviated Wash. Office of Supt. of Publ. Instr.); National Institute of Neurological Disorders and Stroke (NINDS), "NINDS Reyes Syndrome Information Page," [http://www.ninds.nih.gov/disorders/reyes\\_syndrome](http://www.ninds.nih.gov/disorders/reyes_syndrome) (2006).
2. Allegheny County (Penna.) Health Department Division of Infectious Diseases, "Guide to Infectious Disease for Schools and Day Care Centers" (1998), [http://www.achd.net/infected/pubs/pdf/10\\_school\\_guide.pdf](http://www.achd.net/infected/pubs/pdf/10_school_guide.pdf), p. 3. (Subsequently abbreviated as Allegheny Co. Health Dept.)
3. Wash. Office of Supt. of Publ. Instr., p. 27.
4. *Ibid.*, p. 27.
5. *Ibid.*, p. 28.
6. Wash. Office of Publ. Instr., p. 35.
7. Centers for Disease Control and Prevention (CDC), Division of Bacterial and Mycotic Diseases, "Foodborne Illness" (2005), p. 10; Washington State University, Food Safety Information for Consumers, "Avoid Cross-Contamination" (2006), p. 1.
8. North Carolina University Cooperative Extension, A & T State University, Disaster Readiness, Response, Recovery, "Washing and Sanitizing Kitchen Items" (2000), p. 1.
9. Wash. Office of Publ. Instr., Allegheny Co. Health Dept., pp. 2-12.
10. Anthony E. Fiore, "Hepatitis A Transmitted by Food," *Food Safety* 38 (2004), p. 711.
11. CDC, "Foodborne Illness," p. 2.
12. CDC, Department of Health and Human Services, "Traveling This Summer? Here Are Tips for Safe and Healthy Traveling," *Travelers' Health* (2006), p. 2.
13. Fiore, "Hepatitis A Transmitted by Food," *Food Safety*, pp. 705-715; Annemarie Wasley, Anthony Fiore, and Beth P. Bell, "Hepatitis A in the Era of Vaccination" (2006) pp. 1, 2.
14. Fiore, p. 710.
15. *Ibid.*, pp. 705, 706.
16. *Ibid.*, p. 706.
17. *Ibid.*, p. 705; CDC, "Hepatitis Fact Sheet" (2005), pp. 1, 2.
18. Wash. Office of Supt. of Publ. Instr., p. 27; Allegheny Co. Health Dept.
19. Fiore, p. 711.
20. *Ibid.*, p. 706.
21. Allegheny Co. Health Dept., p. 11.

## editorial

Continued from page 3

later in life that students will realize the value of their networks and sense how the quality of their relationships affects their success and satisfaction in work and life. Social scientists describe this as the building of social capital.

It need not be an either/or proposition: what you know versus who you know. But isn't the most important reason for Adventist education to help students develop a relationship with God and their Savior, and thereby become more like they were created to be? The significance of this is emphasized in the prayer of Christ: "Righteous Father, though the world does not know you, I know you, and they know that you have sent me. I have made you known to them, and will continue to make you known in order that the love you have for me may be in them and that I myself may be in them" (John 17:25, 26, NIV).

So perhaps who you get to know while in school may be most important



Students at Pacific Adventist University, Papua New Guinea

after all. Imagine the thrill of finding out that you have an Old Friend in that New Country.—Lisa M. Beardsley.

### REFERENCES

1. Parker Palmer, *To Know as We Are Known: A Spirituality of Education* (San Francisco: Harper-SanFrancisco, 1983).
2. L. S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*, M. Cole et al., eds. (Cambridge, Mass.: Harvard University Press, 1978).
3. Parker J. Palmer, *The Courage to Teach: Exploring the Inner Landscape of a Teacher's Life* (San Francisco: Jossey-Bass, 1998), p. 54.

22. "Electrolyte," *Wikipedia* (2006), p. 1; CDC, Division of Bacterial and Mycotic Diseases, "Cholera" (2005), p. 2.

23. CDC, Division of Bacterial and Mycotic Diseases, "Typhoid Fever" (2005), p. 1.

24. *Ibid.*, p. 3.

25. *Ibid.*, p. 1.

26. Allegheny Co. Health Dept., pp. 3-6; Washington Office of Supt. of Public Instruction, p. 33.

27. "Water Purification," *Wikipedia*, [http://en.wikipedia.org/wiki/Water\\_purification](http://en.wikipedia.org/wiki/Water_purification), pp. 4, 6; The Ranger Digest.com, "Filtering and Purifying Water," pp. 5, 6; FEMA, "Guidelines for Managing Water Supplies," <http://www.fema.gov/plan/prepare/watermanage.shm#2>.

28. The Food-Safe Schools Action Guide, <http://www.foodsafeschools.org/foodservice.phg>.

29. Wash. Office of Supt. of Publ. Instr., p. 89.

30. Allegheny Co. Health Dept., p. 17.

31. *Ibid.*; Wash. Office of Supt. of Publ. Instr., p. 89.

32. *Ibid.*

33. "Head Lice," <http://www.headlice.org>; National Pediculosis Assoc., Inc., *Medicine Consumer Health* (2005), p. 1.

34. *Ibid.*

35. Allegheny Co. Health Dept., pp. 9, 10.

36. *Ibid.*

37. *Medicine Consumer Health*, "Lice" (2005), <http://www.emedicinehealth.com/lice/article>, p. 1.

38. "Parasitism," *Wikipedia*, <http://en.wikipedia.org/wiki/Parasite>; "Parasitic Roundworm Diseases," Health Matters, Fact sheet prepared by National Institute of Allergy and Infectious Diseases, National Institutes of Health, U.S. Department of Health and Human Services (February 2005), <http://www.niaid.nih.gov/factsheets/roundwor.htm>.

39. Wash. Office of Supt. of Publ. Instr., p. 85.

40. Allegheny Co. Health Dept., p. 10.

41. Wash. Office of Supt. of Publ. Instr., p. 85.

42. CDC, Division of Vector-Borne Infectious Diseases, "Lyme Disease Transmission" (2005), [http://www.cdc.gov/ncidod/dvbid/lyme/ld\\_transmission.htm](http://www.cdc.gov/ncidod/dvbid/lyme/ld_transmission.htm), p. 2.

43. CDC, "Malaria, Frequently Asked Questions About Malaria" (2005), p. 1.

44. *Ibid.*, p. 6.

45. CDC, Division of Vector-Borne Infectious Diseases, "Questions and Answers, Overview of West Nile Virus" (2004), <http://www.cdc.gov/ncidod/dvbid/westnile/ga/overview.html>.

46. *Ibid.*, p. 1.

47. CDC, Department of Health and Human Services, "West Nile Virus, Fact Sheet" (2005), <http://www.cdc.gov/westnile>, p. 1.

48. *Ibid.*

49. World Health Organization (WHO), "Epidemic and Pandemic Alert and Response" (EPR) (2006), <http://www.who.int/csr/diseas/yellowfever>.

50. *Ibid.*, p. 1; Directors of Health Promotion and Education, "Yellow Fever" (2006).

51. Directors of Health Promotion and Education, "Yellow Fever," p. 1.

52. *Ibid.*

53. *Ibid.*

54. Wash. Office of Supt. of Publ. Instr., p. 8.

circle  
circle.adventist.org

Teaching the Adventist worldview?  
circle.adventist.org  
linking educators. any level. anytime. anywhere.