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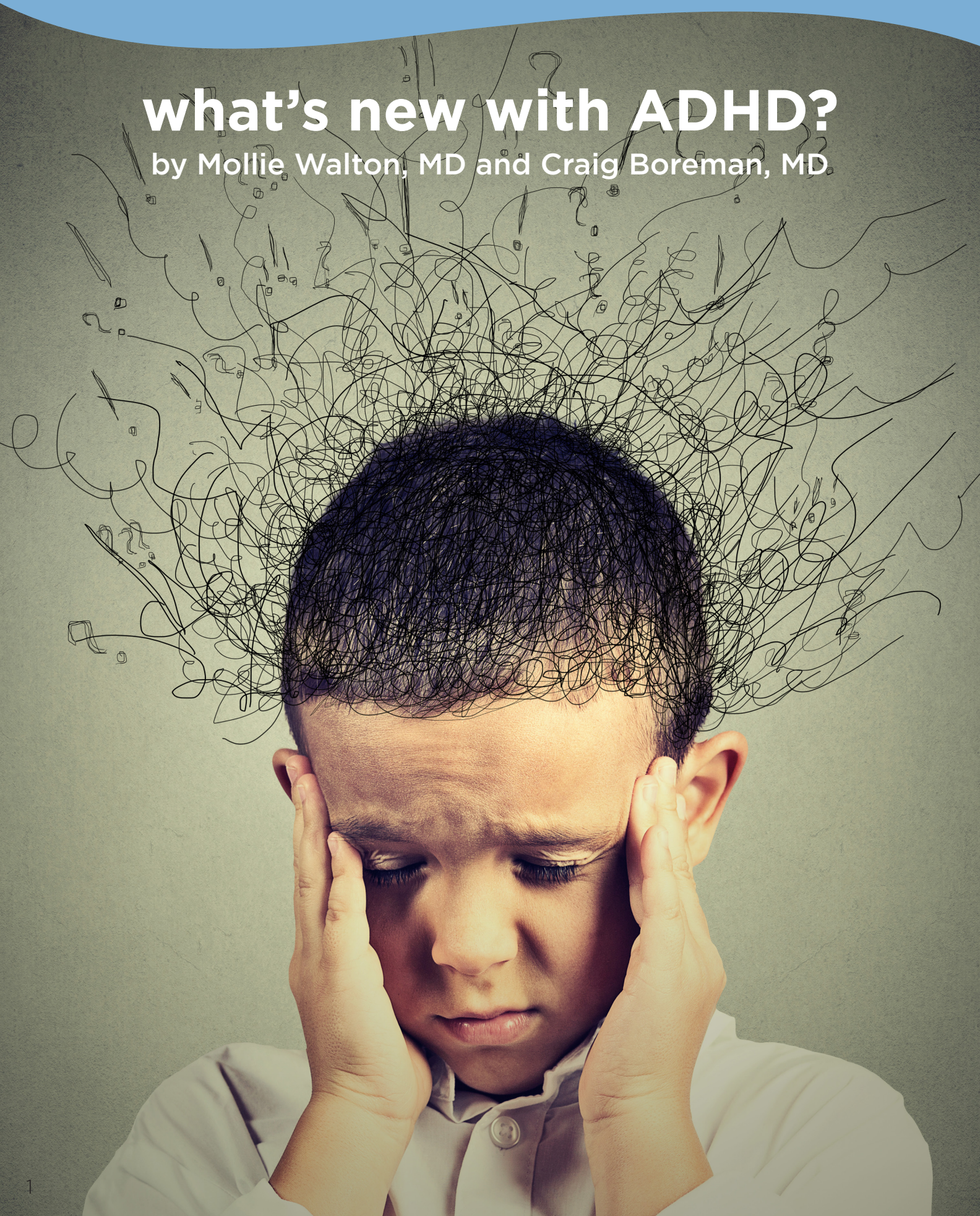
what's new with ADHD?

by Mollie Walton, MD and Craig Boreman, MD



learning objectives

Following the completion of this article, the reader should be able to:

1. Utilize the updated clinical practice guideline for diagnosis and treatment of ADHD.
2. Describe the approach to the evaluation and treatment of ADHD in the primary practice setting.
3. Give examples of co-existing conditions associated with ADHD.

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurobehavioral disorders of childhood and can profoundly affect children's academic achievement, social interactions and well-being.

Reported prevalence of ADHD varies based on differences in research methods, the age groups being described, and changes in the diagnostic criteria over time. Notwithstanding, a 2016 national survey indicated that 8.4% of children 2-17 years of age in the United States currently had ADHD, representing 5.4 million children.[5] Symptoms of ADHD appear in childhood, and most children with ADHD continue to have symptoms, with associated impairment, through adolescence and into adulthood. With time, the overt hyperactive and impulsive symptoms tend to decline, whereas the inattentive symptoms tend to persist.[1,2] Learning and language difficulties are common comorbid conditions associated with ADHD.[3] Boys are twice as likely as girls to receive the ADHD diagnosis,[4,5,6] perhaps because hyperactive behaviors, generally seen more frequently in boys, are easily observable and potentially disruptive. The majority of both boys and girls with ADHD also meet criteria for an additional mental health disorder.[7,8] Boys are more likely to exhibit externalizing conditions, such as oppositional defiant disorder or conduct disorder;[7,9,10] whereas internalizing conditions, like anxiety or depression, are more common among girls.[11]

The American Academy of Pediatrics (AAP) first published clinical recommendations for evaluation and diagnosis of pediatric ADHD in 2000, with treatment recommendations following in 2001. These guidelines established the use of the Diagnostic and Statistical Manual of Mental Disorders criteria for diagnosis, recommended behavioral rating scales to help establish the diagnosis, and outlined standards for follow-up and monitoring.[12] The guidelines were revised in 2011 and published with an accompanying process of care algorithm (PoCA). The major change with this revision was the applicable age for diagnosis and treatment, previously 6-12 years of age, and was broadened to include age 4- to 6-year-olds and adolescents up to age 18 years.[12] Since the release of the 2011 guideline, the Diagnostic and Statistical Manual of Mental Disorders has been revised to the fifth edition, and new ADHD-related research has been published. The DSM-5 criteria are similar to the 2011 guidelines with two exceptions. Fewer problem behaviors are required for those 17 years or older, and there must be evidence that symptoms began before age 12 years instead of before age 7 years.[12] Interestingly, these interim publications do not support dramatic changes to previous recommendations. Thus, the new guideline published in October of this year includes only incremental updates to the 2011 guideline.

As with the original 2000 clinical practice guidelines (CPG) and the 2011 revision, the AAP collaborated with several organizations to form an ADHD subcommittee under the oversight of the AAP Council on Quality Improvement and Patient Safety.[13] This subcommittee's membership included representation of a wide range of primary care and subspecialty groups. The group met over a 3.5-year period (2015-2018) to review practice changes and newly identified issues since the 2011 guidelines. The subcommittee developed a series of research questions to direct an evidence-based review sponsored by one of the Evidence-Based Practice Centers of the U.S. Agency for Healthcare Research and Quality (AHRQ); these questions assessed diagnostic and treatment areas on the basis of research published from 2011-2016, pertaining to children and adolescents 4-18 years of age.[13]

clinical questions pertaining to ADHD diagnosis were as follows:

1. What is the comparative diagnostic accuracy of approaches that can be used in the primary care setting or by specialists to diagnose ADHD among children younger than 7 years of age?

2. What is the comparative diagnostic accuracy of EEG, imaging or executive function approaches that can be used in the primary care setting or by specialists to diagnose ADHD among patients age 7-18 years?

3. What are the adverse effects of being labeled correctly or incorrectly as having ADHD?

4. Are there more formal neuropsychological, imaging or genetic tests that improve the diagnostic process?

treatment questions were as follows:

1. What are the comparative safety and effectiveness of pharmacologic and/or nonpharmacologic treatments of ADHD in improving outcomes associated with ADHD?

2. What is the risk of diversion of pharmacologic treatment?

3. What are the comparative safety and effectiveness of different monitoring strategies to evaluate the effectiveness of treatment or changes in the ADHD status (for example, worsening or resolving symptoms)?

Guided by the evidence quality and grade, the subcommittee developed seven key action statements for the evaluation, diagnosis and treatment of ADHD in children and adolescents. In October 2019, Pediatrics published Clinical Practice Guideline for the Diagnosis, Evaluation and Treatment of Attention-Deficit/Hyperactivity Disorder (ADHD) in Children and Adolescents. This updates and replaces the 2011 clinical practice guideline revision published by the AAP, titled Clinical Practice Guideline: Diagnosis and Evaluation of the Child with Attention-Deficit/Hyperactivity Disorder. This most recent guideline, similar to its predecessor, addresses the evaluation, diagnosis and treatment of ADHD in children from age 4-18 years. The revised AAP guidelines also include a process of care algorithm and a paper on barriers to care.

Since 2011, the ADHD-related research reflects increased understanding in and recognition of the prevalence and epidemiology of ADHD; the challenges it presents for both children and their families; the need for a comprehensive clinical resource for the evaluation, diagnosis and treatment of ADHD; and the barriers that may impede its implementation.[13] In response, the revised guideline is supported by two accompanying documents: 1) a PoCA for the diagnosis and treatment of children and adolescents with ADHD, and 2) an article on systemic barriers to the care of patients with ADHD. The necessary complex care best occurs in the patient-centered medical home.[13] Updated from 2011, the guidelines are relevant for primary care pediatricians, pediatric nurse practitioners and physician assistants, and family medicine practitioners.[12] The steps recommended in the guideline necessitate spending more time with patients and their families; developing a care management system of contacts with school and other community members; and providing continuous, coordinated patient care. Given the nationwide dilemma of limited access to mental health clinicians, primary care physicians are increasingly charged to provide services to patients with ADHD and their families. To assist primary care physicians in overcoming such obstacles, the companion articles on systemic barriers reviews and makes recommendations to address the barriers to enhance care for these patients. Recommended treatments remain essentially unchanged. The stimulant class of medications, including methylphenidate and amphetamines, are generally the initial treatments. Atomoxetine and the extended-release alpha-2 agonists, guanfacine and clonidine, remain the secondary alternative medications. Behavior therapy is recommended as the first-line treatment for preschoolers. In this respect, behavior therapy describes behavior management for preschoolers with ADHD as parent training in behavior management (PTBM).[12]

The release of revised AAP guidelines for the care of pediatric patients with ADHD offers clinicians updates and opportunities as they continue to provide long-term, comprehensive care for this common and pervasive condition.

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CME questions

1. **ADHD is a condition often seen in isolation and, therefore, does not warrant further investigation into the possibility of comorbid mental health disorders.**

a. True

b. False

2. **The revised ADHD CPG recommends early referral to mental health clinicians for diagnosis and treatment of pediatric ADHD.**

a. True

b. False

re-test the mother: prevention of perinatal human immunodeficiency virus infection

by Shafee Salloum, MD, FAAP

case report

A 7-month-old boy was admitted to the hospital due to worsening cough and failure to thrive. His cough started one month prior to presentation and during this time he lost 100 grams in his weight. He was fed cow's milk-based formula with no reported emesis or diarrhea. There were no known sick contacts and his immunizations were up to date. Past history was significant for hospitalizations at age 3 months and 4 months due to bronchiolitis and upper respiratory tract viral infection. He followed up with a developmental clinic due to delayed developmental milestones. Birth history was notable for full-term boy, who was born vaginally with no complications. His mother was incarcerated during pregnancy, had a history of injection drug use and was treated appropriately for gonorrhea in her early pregnancy.

learning objectives

Following the completion of this article, the reader should be able to:

1. Maintain a high index of suspicion for HIV infection in infants with worsening pneumonia, failure to thrive and developmental delay, especially in high-risk maternal behavior like incarceration and injection drug use.
2. Have an understanding of repeat HIV testing, now recommended in the third trimester in high-risk groups like injection drug use, incarceration, history of sexually transmitted disease and multiple sex partners.
3. Be aware that pneumocystis pneumonia (PCP) is the most common presentation in unrecognized HIV infection in infancy.

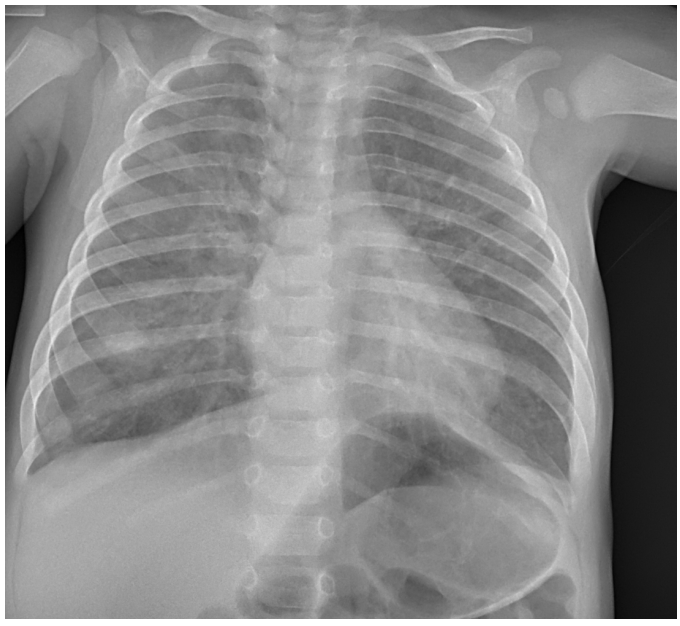

figure 1. Chest X-ray shows diffuse alveolar opacification

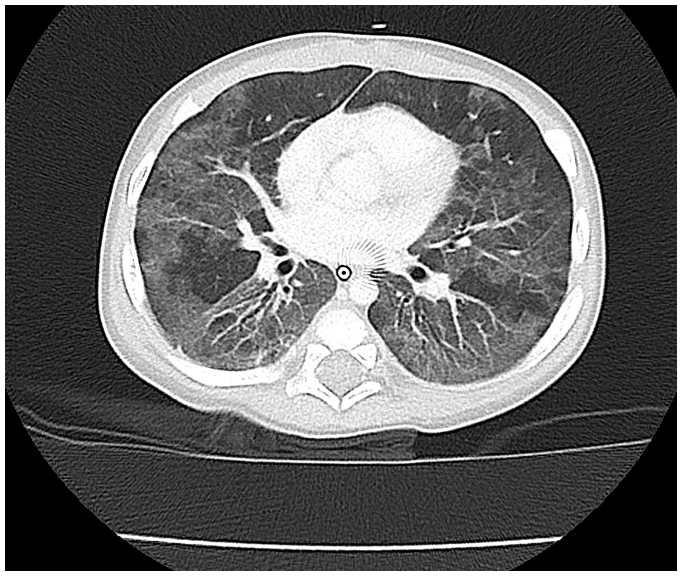

figure 2. Chest X-ray shows diffuse alveolar opacification

Prenatal laboratory screenings in the first trimester for hepatitis B virus, syphilis and human immunodeficiency virus-1 (HIV-1) were all negative.

Physical examination on presentation revealed an alert infant in moderate respiratory distress. Temperature 36.7°C, heart rate 160 beats/minute, respiratory rate 47 breaths/minute, and oxygen saturation 86% on room air. Weight 7.8 kg (20th percentile). Lungs sounded coarse on auscultation with subcostal retractions and nasal flaring. Abdomen was soft with no organomegaly and cardiac examination was normal. Investigations showed normal white blood cell counts of 8.6 x 10^3/μL, electrolytes and renal function test. Chest radiograph is shown in figure 1. The patient was placed on high flow nasal cannula and received intravenous ceftriaxone for suspected bacterial pneumonia. Vancomycin was added later to broaden antimicrobial coverage, and nebulized albuterol and systemic steroids were added as well in an attempt to wean him of oxygen supplementation. However, the patient's respiratory condition continued to deteriorate and ultimately, he required ventilator support. Chest computed tomography was obtained one week after admission to the hospital (see figure 2).

The worsening pneumonia in association with developmental delay and failure to thrive raised a concern for underlying immune deficiency. HIV infection, acquired perinatally, was suspected based on the mother's high-risk behavior during pregnancy, although her testing was negative in the first trimester. The infant's HIV RNA viral load was 9,800,000 copies/ml, CD4 lymphocyte percentage was 4% (normal <35%), and the absolute CD4 count was 61 cells/μL, indicative of severe immunosuppression. The patient underwent bronchoscopy and his bronchoalveolar lavage tested positive for *Pneumocystis jirovecii* by polymerase chain reaction (PCR). Magnetic resonance imaging of his brain showed generalized cerebral atrophy consistent with HIV encephalopathy. Based on the previous findings, our patient met the case definition for Acquired Immune

Deficiency Syndrome (AIDS). He was started on combined antiretroviral therapy (ART) for his HIV infection and trimethoprim-sulfamethoxazole (TMP-SMX) and steroids for Pneumocystis pneumonia (PCP). He was discharged home on prophylactic TMP-SMX. He was doing well at his 2-month follow-up visit; CD4 was 19%, CD4 cell count 424 cells/μL, and RNA viral load was 3,000 copies/ml. He continued to follow up with the infectious disease and developmental clinics.

key points

- Maintain a high index of suspicion for HIV infection in infants with worsening pneumonia, failure to thrive and developmental delay, especially with high-risk maternal behavior like incarceration and injection drug use.
- Repeat HIV testing is now recommended during the third trimester in women in high-risk groups such as those with injection drug use, incarceration, history of sexually transmitted disease and multiple sex partners.
- Pneumocystis pneumonia (PCP) is the most common presentation in unrecognized HIV infection in infancy.

discussion

The vast majority (95%) of HIV infections in young children are acquired perinatally, including intrauterine, intrapartum and postnatally through breastfeeding.[1] Prior to the introduction of ART, 25% of children born to HIV infected mothers would become infected. This number increased to 50% with prolonged breastfeeding.[1,2] Preventive strategies have reduced the risk of perinatal transmission of HIV to less than 1% in the United States. These strategies include:

1. Administering ART to HIV-infected mothers during pregnancy and to their infants immediately after birth until HIV infection is excluded

2. Elective Cesarean delivery in women with unknown or elevated viral load

3. Avoidance of breastfeeding[2]

Needless to say, it is important to identify HIV infection status in pregnant women. Routine HIV testing is part of prenatal care. The American College of Obstetricians and Gynecologists (ACOG) recommends repeat HIV testing in the third trimester for pregnant women with initial negative testing in certain circumstances[3] (see table 1).

Repeat HIV testing in third trimester in the following conditions[3]
History of injection drug use (as in this case)
History of sexually transmitted disease in the past year (as in this case)
Incarceration (as in this case)
Signs and symptoms of acute HIV infection
HIV infected partner or more than one sex partner during current pregnancy
Women who exchange sex for money or drugs

table 1. Conditions under which repeat HIV testing should be conducted in the third trimester.

Compared to adults infected with HIV, infants infected with HIV perinatally are at higher risk for rapid disease progression and death. The most common AIDS defining conditions in perinatally acquired HIV infection in U.S. infants include PCP, failure to thrive/wasting syndrome, and HIV encephalopathy (as in this case), in addition to recurrent bacterial infections, esophageal candidiasis, and cytomegalovirus disease (pneumonia, encephalitis, colitis or retinitis).

PCP due to the fungus *Pneumocystis jirovecii* was the most common presentation for HIV infections in infants prior to ART implementation. It presents as persistent cough, tachypnea, dyspnea, hypoxia, poor feeding and low-grade fever. The mortality rate is 100% in untreated cases.[4] First line treatment is with TMP-SMX in addition to glucocorticoids.[5] Severe and recurrent mucosal candidiasis is another common presentation of unrecognized HIV infection in infancy. Other manifestations include recurrent bacterial pneumonia, generalized lymphadenopathy, chronic parotitis and chronic interstitial lung disease. Abnormal cognitive and motor development along with failure to thrive are also important implications of

untreated HIV infection.[6]

Treatment of HIV infection consists of combined ART (https://aidsinfo.nih.gov/guidelines). Primary care physicians have consistent exposure to children during the first few months of life and have the ability to recognize deviations from expected growth trends and/or appropriate developmental milestones. Monitoring children through frequent well child visits allows the physician to screen for more serious sequelae associated with these deviations. HIV should continue to be a differential in these scenarios.

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CME questions

3. Repeat HIV testing in pregnancy is recommend for women with an initial negative test in the first trimester under the following circumstances:

a. Women who are incarcerated.

b. Women with a history of sexually transmitted disease in the past year.

c. Women with a history of injection drug use.

d. Women who exchange sex for money or drugs.

e. All of above.

4. The most common presentation of unrecognized HIV infection in infancy is:

a. Encephalopathy

b. Failure to thrive

c. Cytomegalovirus infection

d. PCP

e. Candida esophagitis

5. Preventive strategies have reduced the risk of perinatal transmission of HIV to:

a. less than 1%

b. 10%

c. 25%

d. 50%

e. 75%

clostridioides difficile: a primer for the clinician

by Michael D. Bates, MD, PhD,
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Clostridioides difficile **(formerly known as *Clostridium difficile*, also referred to as *C. difficile* or *C. diff*) is associated with a range of gastrointestinal illness, as well as with asymptomatic colonization that is common, especially in young infants. This paper will discuss the approach to diagnosis, management and prevention of *C. difficile* infection (CDI) in the pediatric population.**

learning objectives

Following the completion of this article, the reader should be able to:

1. Review risk factors for acquisition of *Clostridioides difficile (C. difficile)* infection in children.
2. Discuss the appropriate approach to diagnosis of *C. difficile* infection.
3. Describe treatment strategies in patients with *C. difficile*-associated diarrhea.

microbiology and pathophysiology

Clostridioides difficile is an anaerobic, Gram-positive, spore-forming bacillus. It is found in the environment and the gastrointestinal tract of animals and humans. It can be acquired either from the environment or by the fecal-oral route. *C. difficile* spores can survive for years in the environment and are resistant to heat, radiation, drying, chemicals and oxygen. *C. difficile* pathogenicity is attributed to the production of two protein toxins designated A (enterotoxin) and B (cytotoxin), encoded by the tcdA and tcdB genes, respectively. Both toxins cause significant disease. The toxins enter the cytoplasm of the colonic mucosa by binding to receptors that are found on the luminal-facing side of these cells. Once inside the cells, they inactivate a number of proteins involved in cytoskeleton organization, triggering the apoptosis (cell death) of colonic cells.[1] This results in an acute inflammatory reaction with *C. difficile* infection ranging from mild or moderate watery diarrhea to pseudomembranous colitis with bloody diarrhea, fever and abdominal pain (figures 1a and 1b). Severe illness can result in ileus, toxic megacolon or death. An epidemic hypervirulent *C. difficile* strain, ribotype 027 (formerly referred to as NAP1/BI/027), which emerged in the mid-2000s, resulted in severe outbreaks across many countries. Infecting predominantly adults, this strain was more virulent, perhaps due to increased production of toxins A and B and generation of an additional toxin known as binary toxin.[2]

epidemiology of *C. difficile* infection in children

The reported overall incidence and severity of CDI in both the adult

and pediatric populations have increased in the past two decades. A population-based study conducted in Minnesota from 1991 to 2009 reported an increase of CDI from 2.6 to 32.6 per 100,000 pediatric residents.[3] In a similar epidemiology study conducted in 10 areas throughout the U.S., 71% of pediatric cases identified were community acquired, differing from historical trends where most cases were thought to be associated with hospitalization. The highest incidence of CDI occurred in children 1 to 5 years of age. Although this estimate could be affected by differences in testing methods, this increase was reported prior to more widespread use of molecular testing. A hypervirulent strain appears to be responsible for up to 20% of pediatric CDI cases.[4]

C. difficile-associated diarrhea (CDAD) is defined as diarrheal symptoms or toxic megacolon with a positive result of a laboratory assay/pathologic evidence of pseudomembranous colitis. Diarrhea is defined as one of the following: three unformed stools in 24 hours for two days; six watery stools in 36 hours; or eight unformed stools over 48 hours. Although there is no consensus definition of refractory CDAD, it is commonly identified when more than three to six days of symptoms persist after initiation of active therapy. Recurrent CDAD is defined as a repeated episode of diarrhea within eight weeks of the first occurrence. Return of diarrheal symptoms within two weeks of the initial presentation constitutes a relapse. Community-acquired CDI results when positive specimens are obtained outside of a hospital, more than four weeks after hospital discharge, or two days or less after admission.[5]

Three major factors place pediatric patients at risk for CDAD: exposure to the spores, disruption of the colonic flora and impairment of host defenses. Modifiable risk factors for CDAD in children include those similar for adults, such as recent antimicrobial use (see table 1) or use of acid suppressing medications, specifcally with the use of proton pump inhibitors, for more than 28 days.

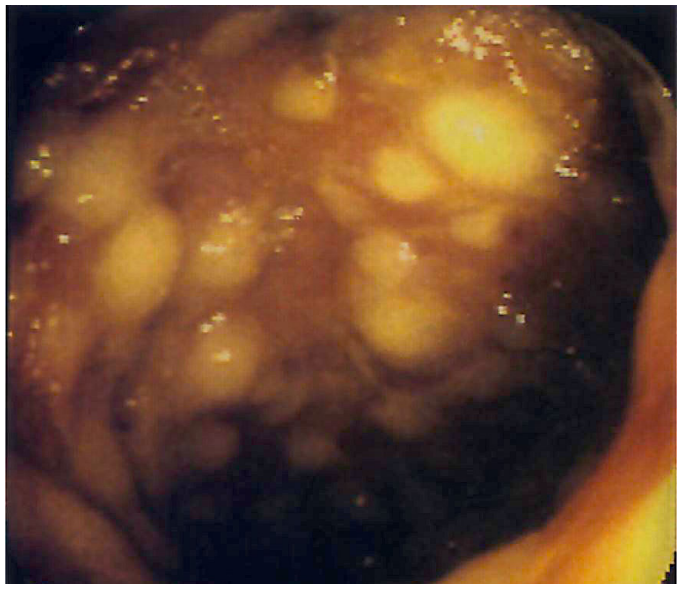

figure 1a.

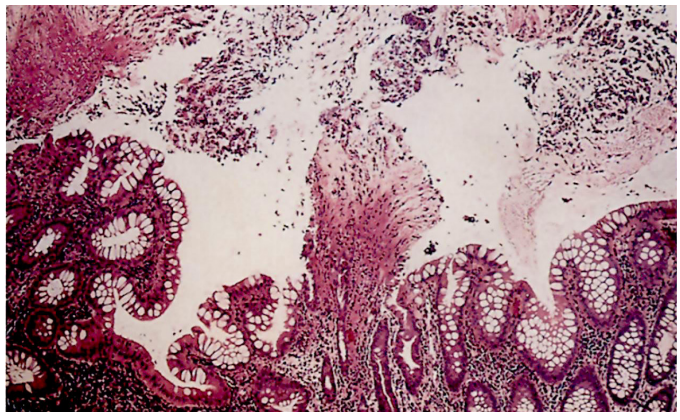

figure 1b.

figure legend: Pseudomembranous colitis.

1a. Endoscopic appearance of a pseudomembranous colitis in an 18-year-old young woman with a 3-week history of diarrhea, urgency to defecate and abdominal pain.

1b. Colonic biopsy demonstrated a so-called "volcano lesion" of fibropurulent exudate mixed with mucin.

high-risk antibiotics	low(er)-risk antibiotics
Clindamycin	Tetracyclines
Cephalosporins*	Glycopeptides
Fluoroquinolones	Oxazolidinoones
Carbapenems	Macrolides
Penicillins ± beta-lactamase inhibitors	Penicillins alone
Combination therapy	Sulfamethoxazole Trimethoprim

table 1.[6,7] Antibiotics and risk for development of *C. difficile*-associated diarrhea.

**First generation cephalosporin antibiotics may be considered lower risk.*

Decreased gastric acidity may lead to inadequate elimination of ingested organisms or disruption of the indigenous gut flora causing colonization. Non-modifiable risk factors for CDAD in children may include complex chronic conditions such as inflammatory bowel disease, immunosuppression, or presence of gastrostomy or jejunostomy tubes.[6,7]

Asymptomatic colonization with either toxigenic or nontoxigenic strains among many infants and young children has been reported, with rates as high as 37% in infants <1 month of age. Colonization rates decrease with increasing age and typically drops by age 3 to 0-3%, similar to that found in adults. Several mechanisms have been proposed to explain why young children remain asymptomatic: a lack of toxin receptors on the surface of intestinal cells, the protective effect of breastmilk, or inherent defenses provided by neonatal intestinal flora. Consequently, testing in this age group should be avoided unless other infectious and non-infectious causes of diarrhea have been excluded.[7]

Determining the optimal number of episodes of diarrhea to justify testing depends on several factors: the likelihood of true infection, confounding factors such as underlying disease states, and testing methods. Patients with unexplained and new onset diarrhea and ≥ 3 unformed stools in 24 hours are the currently recommended target population for CDI testing. However, using these criteria, two authors found that 36% and 39% of patients respectively did not meet the definition. Reliability of these criteria may be improved if the patient has concurrent abdominal pain and/or fever > 100.4°F. Providers should request testing only for patients who have been laxative-free for 48 hours, who are not receiving tube feedings or have other potential causes of diarrhea. Specimens that cannot conform to the shape of the container should be rejected. Due to high colonization rates, testing is discouraged in children < 2 years of age and without symptoms strongly suggesting CDI.

Almost all antibiotics are capable of disrupting the normal gut microflora, which can allow for *C. difficile* to flourish and produce toxin.[3] Longer antibiotic durations and use of multiple concomitant antibiotics are two risk factors highlighted by the Infectious Diseases Society of America (IDSA) guideline that increase the risk of antibiotic-associated *C. difficile* diarrhea.[5] Two meta-analyses report specific antibiotic classes that are associated with higher risk of *C. difficile* infection. Clindamycin carries the highest risk of *C. difficile* infection with an odds ratio of about 17-20 compared to no antibiotic exposure. Fluoroquinolone, cephalosporin and carbapenem antibiotics carry a fairly high risk, all of which being associated with an odds ratio of approximately 5 compared to no antibiotic exposure. Table 1 summarizes the risk that antibiotics pose for the development of CDAD.

laboratory testing

A number of diagnostic laboratory methods are available to diagnose infections due to *C. difficile*. Exactly when to order and which modality to utilize can be somewhat confusing at times. Recent discussions of the diagnostic testing available suggest that perhaps a two-step algorithmic approach may be more accurate in the diagnosis of CDI.[2]

when to order *C. difficile* testing

- Patient is over 2 years of age
- Patient is NOT taking laxatives, GI prep, tube feedings or other causes of diarrhea
- The patient has had > 3 liquid stools within the last 24 hours to qualify as a testing candidate, AND has
    - o Abdominal pain, and/or
    - o Fever > 100.4°F, and/or
    - o Nausea, and/or
    - o Leukocytosis

what tests to order for *C. difficile*

- *C. difficile* culture from stool is not clinically useful because of slow turnaround and isolation difficulties. Culture growth also does not determine if toxin is present as well.
- Cell culture cytotoxicity assay (CCNA) is not useful clinically because of its limited availability and slow turnaround time. While once the gold standard, it has been replaced by more sensitive tests.
- Toxin EIA (enzyme immunoassay) detects toxin A and/or B. It is these toxins that result in *C. difficile* disease. Unfortunately toxin EIA has a low sensi-

tivity. With the low prevalence rates of disease in children, this leads to an unacceptable low positive predictive value.

- Glutamine dehydrogenase (GDH) is an enzyme produced by the *C. difficile* bacteria. It has a low specificity and should only be used as part of a two-step algorithm with a confirmation of positive results.
- Polymerase Chain Reaction (PCR), also called Nucleic Acid Amplification Test (NAAT), detects the gene that codes for the toxin and is the most sensitive of the tests. Unfortunately it does not detect the presence of toxin, but only the toxin gene. Problems arise due to colonization with *C. difficile* bacteria without toxin being produced. This leads to false positive results.

two-step algorithm when a PCR for *C. difficile* is ordered

- A PCR is performed initially
- Negative PCR tests would be reported as negative
- Positive PCR test would be reflexed to a GDH/Toxin EIA with the following results:
  - o Positive PCR and positive for both GDH and Toxin EIA would be reported as positive. This means that both the bacteria and toxin are present.
  - o Positive PCR and negative for both GDH and Toxin EIA would be reported as suggestive of colonization. *C. difficile* bacteria are present but no toxin is detected. The absence of toxin likely represents colonization by *C. difficile* bacteria.

Table 2 summarizes the sensitivity and specificity of these tests and notes the clinical utility of each.[2,5] The laboratory at Dayton Children's is investigating the use of the two-step algorithm as noted above.

treatment of *C. difficile* disease

Before *C. difficile* was recognized as the cause of antibiotic-associated diarrhea, the only known treatment was to withdraw the offending antibiotic therapy.[10] Antibiotic withdrawal remains an important ancillary strategy in the treatment of *C. difficile* infections. The identification of *C. difficile* as the pathogen in antibiotic-associated diarrhea resulted in the development of antibiotic regimens against this pathogen. Oral vancomycin was the first antibiotic to be reported in the treatment of this infection. This antibiotic was found to be effective, and it had the additional advantage of not being systemically absorbed and thus not having systemic side effects. The downside with using this antibiotic is that it has been very costly. In addition, there is the concern about promoting the development of other vancomycin-resistant organisms. Several years later, metronidazole was found to be effective and is much less expensive. This antibiotic is absorbed in the upper gastrointestinal tract, but biliary excretion and exudation of the metronidazole from inflamed colon results in a therapeutic intraluminal concentration. Because of the lower expense of this medication, it

test	sensitivity	specificity	availability	utilization
C.difficile culture	Low	Moderate	Limited	No diagnostic use. Only toxigenic strains cause disease.
Toxigenic culture	High	High	Limited	Reference method. Epidemiologic tool. Limited diagnostic use.
CCNA	High	High	Limited	Reference method. Limited diagnostic use.
GDH	High	Low	Widely	Diagnostically used as a screening tool, results must be confirmed.
Toxin EIA	Low	High	Widely	Detects toxin A+B; inferior sensitivity.
PCR or NAAT	High	High	Widely	Use only in acute disease; false positives of concern. Detects the toxin gene but not the presence of toxin.

table 2. Laboratory tests for the detection of *C. difficile* infection.

CCNA, C.difficile cytotoxin neutralization assay; GDH, Glutamate dehydrogenase; EIA, enzyme immunoassay; NAAT, nucleic acid amplification test

became the mainstay for primary treatment of CDI. However, resistant strains of *C. difficile* have been described. Other antibiotics have been described, but they are not accepted for therapy. Most recently, fidaxomicin has received a U.S. Food and Drug Administration (FDA) indication for treatment of CDAD in adults. In January 2020, fidaxomicin received an FDA indication in children older than 6 months of age for treatment of CDAD with recommended dosage based on weight. It remains to be seen how the FDA's action will affect guidelines for treatment of *C. difficile* infections.

The Infectious Diseases Society of America has developed clinical practice guidelines for the treatment of *C. difficile*. The most recent update was released in 2017 and published in 2018.[5] In the following discussion, we rely on this guideline. The key points are summarized in the table 3.

For treatment of an initial episode of *C. difficile* infection that is not severe, either metronidazole or vancomycin can be given for a 10-day course. However, it is recommended that more severe courses or fulminant courses of *C. difficile* should be treated with vancomycin. If ileus prevents giving vancomycin by mouth, it can be given per rectum. In addition, administration of metronidazole intravenously in addition to metronidazole may be considered in patients with ileus. With recurrences of *C. difficile*, repeat courses of oral metronidazole or vancomycin can be given. However, if the patient was given metronidazole with the first episode and did not have a complete clinical response, vancomycin should be used because the patient may be infected with a *C. difficile* strain that is resistant to metronidazole.

episode type	treatment
Initial non-severe	Metronidazole 7.5 mg/kg/dose (maximum 500 mg dose) PO 3-4 times per day for 10 days ***OR*** vancomycin 10 mg/kg/dose (maximum 125 mg dose) PO 4 times per day for 10 days
Initial severe/fulminant	Vancomycin 10 mg/kg/dose (maximum 500 mg dose) PO/PR 4 times per day for 10 days ± metronidazole 10 mg/kg/dose (maximum 500 mg dose) IV 3 times per day for 10 days
First recurrence, non-severe	Metronidazole 7.5 mg/kg/dose (maximum 500 mg dose) PO 3-4 times per day for 10 days ***OR*** vancomycin 10 mg/kg/dose (maximum 125 mg dose) PO 4 times per day for 10 days
Second or later recurrence	Vancomycin PO in tapered or pulsed regimen ***OR*** vancomycin 10 mg/kg/dose (maximum 125 mg dose) PO 4 times per day for 10 days followed by rifaximin* PO (maximum dose 400 mg 3 times per day) for 20 days ***OR*** fecal microbiota transplantation

table 3. Recommended treatments for *C. difficile* infections in children (from McDonald et al., 2018).

PO, per os; PR, per rectum; IV, intravenously
**Note that rifaximin does not have an FDA indication in children less than 12 years of age, and dosage is not established.*

The difficulty comes in when a patient is having multiple recurrences of CDI. In these cases, the choices are to give vancomycin in a tapered and pulsed regimen, or treating with vancomycin followed by a longer course of rifaximin (although note that the FDA has not approved use of rifaximin in children less than 12 years of age). A variety of tapering or pulsed regimens have been described. The IDSA guideline suggests treatment with vancomycin four times per day for 10-14 days, then two times per day for a week, then one time per day for a week, and then one time per day every two to three days for two to eight weeks.

Most recently, fecal microbiota transplantation has been touted as a treatment for *C. difficile*, particularly for recurrent disease. In this approach, donor fecal material or pooled material is instilled either in the proximal gastrointestinal tract by nasogastric tube or distally via colonoscope. This treatment, which helps to restore a more normal colonic microbiome, has been found to be remarkably effective in recurrent disease, especially in light of poor response to antibiotics in these patients. Although effective, fecal transplantation is not available at all centers due to infrastructure and regulatory

requirements (such as the need for an Investigational New Drug certification from the FDA) for a procedure that is not frequently needed. For example, donor stool must be carefully screened for infection. Because of the potential for transmission of multi-drug resistant organisms, the FDA requires obtaining informed consent about the risks of the procedure.[11] Because of these issues and the likely importance of diversity of the donor microbiome for efficacy, efforts are being made to develop efficacious pools of colonic microbes that are known not to contain pathogens, known or potential.

prevention of *C. difficile* infection

Different strategies are used for the prevention of CDI based on the setting. Because *C. difficile* is a spore-forming organism, it can be difficult to eradicate from the environment. Thus, in health care settings where *C. difficile* is more prevalent, infection control measures to prevent spread are critical. In particular, careful environmental cleaning, including use of sporicidal agents such as bleach, as well as strict hand washing with soap and water, are necessary to prevent the spread of *C. difficile*; alcohol-based hand sanitizers do not kill *C. difficile* spores. Limiting the use of antibiotics where possible is another means of prevention, by decreasing the alteration of the gut microflora. Finally, limiting the use of acid blockers where possible can decrease susceptibility as well.

Again, infection control plays an important role for individuals who have had an infection with *C. difficile* and their family members. Preventing unnecessary use of antibiotics and acid blockers makes the development of *C. difficile* less likely. Please see patient handout at end of article: How to Prevent the Spread of Clostridioides difficile (*C. diff*)

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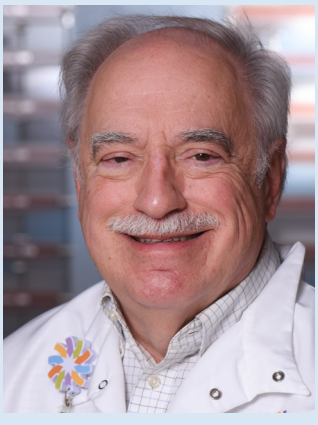

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Michael Brandon, BSMT (ASCP), has been the microbiology and molecular infectious disease lab manager at Dayton Children's since 1976. He is a graduate of Wright State University. Mr. Brandon did his laboratory science internship at St. Elizabeth Medical Center in Dayton where he was also an instructor in medical technology. He is currently program chairman and board member for the South Central Association for Clinical Microbiology.

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CME questions

6. Which of the following is considered first-line treatment for an initial, non-severe infection with *C. difficile*?

A. Vancomycin by mouth

B. Vancomycin per rectum

C. Rifaximin by mouth

D. Metronidazole by mouth

E. A and D

7. Modifiable risk factors for the development of *C. difficile*-associated diarrhea include:

A. Presence of gastrostomy or jejunostomy tubes

B. Inflammatory bowel disease

C. Use of fluoroquinolones

D. Immunosuppression

8. Which factors place pediatric patients at increased risk for development of *C. difficile*-associated diarrhea?

A. Exposure to *Clostridioides difficile* spores

B. Impairment of host defenses

C. Disruption of the colonic flora

D. A and C

E. All of the above

clostridioides difficile (*C. diff*)

how to prevent spreading

- *C. diff* germs are carried from person to person in poop.
- If someone with *C. diff* (or caring for someone with *C. diff*) doesn't clean their hands with soap and water after using the bathroom, they can spread the germs to everything they touch.
- And if someone with *C. diff* can't take a shower with soap and water, they can end up with *C. diff* germs on their skin.
- Then, when someone else touches the skin of that person, or the surfaces that person touched, they can pick up the germs on their hands.
- *C. diff* germs are so small relative to our size that if you were the size of the state of California, a germ would be the size of a baseball home plate. There's no way you can see *C. diff* germs on your hands, but that doesn't mean they're not there.
- Washing with soap and water is the only way to prevent the spread from person to person.
- **Remember:** You can come in contact with *C. diff* germs — and even carry them on, or in, your body — and not get sick. But that doesn't mean you can't infect others.

how long can *C. diff* germs live?

- When C. *diff* germs are outside the body, they become spores. These spores are an inactive form of the germ and have a protective coating allowing them to live for months or sometimes years on surfaces and in the soil.
- The germs become active again when these spores are swallowed and reach the intestines.
- Healthy people will often not be infected even if the spores reach their intestines, but if your immune system is weakened or you've recently taken antibiotics, you could get sick.

how do I make sure I don't spread *C. diff*?

In a health care setting

- Make sure all doctors, nurses and other health care providers clean their hands before and after caring for you. If you don't see your providers clean their hands, ask them to do so.
- While caring for you and other patients with C. *diff*, doctors, nurses and other health care providers will use certain precautions, such as gowns and gloves, to prevent the spread of C. *diff* to themselves and to other patients.

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Print this two-sided handout for your patients, trim at the dotted line.

- If you're in the hospital, wash your hands with soap and water every time you use the bathroom and always before you eat. Remind relatives and friends taking care of you to do the same.

At home

- Wash your hands with soap and water every time you use the bathroom and always before you eat. Remind relatives and friends taking care of you to do the same.
- Try to use a separate bathroom if you have diarrhea. If you can't, be sure the bathroom is well cleaned before others use it.
- Take showers and wash with soap to remove any C. *diff* germs you could be carrying on your body.

how do I kill *C. diff* germs at home?

- Finding C. *diff* germs in the home is not unusual, even when no one in the home has been ill with C. *diff*. Most healthy adults who come in contact with C. *diff* in the home won't get sick.
- Hospitals use special cleaning products to kill C. *diff*, but you can make a cleaner at home. Mix 1 part bleach to 9 parts water.

Surfaces

- When you're cleaning, focus on items that are touched by hands:
  - Doorknobs
  - Electronics (be careful because bleach can damage many electronics and plastics)
  - Refrigerator handles
  - Shared cups
  - Toilet flushers and toilet seats

Laundry

- If someone in your house has C. *diff*, wash items they touch before others use them. These include but are not limited to:
  - Bed linens and towels
  - Household linens
  - Clothing, especially underwear
- If these things have visible poop, rinse them well before washing.
- Then launder in a washer and dryer, using the hottest water that is safe for those items. Use chlorine bleach if the items can be safely washed with it.
- Wash your hands with soap and water after you handle the dirty laundry.
- It's OK to take clothes to a dry cleaner that were worn by a patient infected with C. *diff*. However, dry cleaning isn't as effective as other methods at killing the spores. So this option should be used only for clothes that can't be machine-washed.

Sources: Centers for Disease Control and Prevention (CDC), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Healthcare Quality Promotion (DHQP), November 2019

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above and beyond

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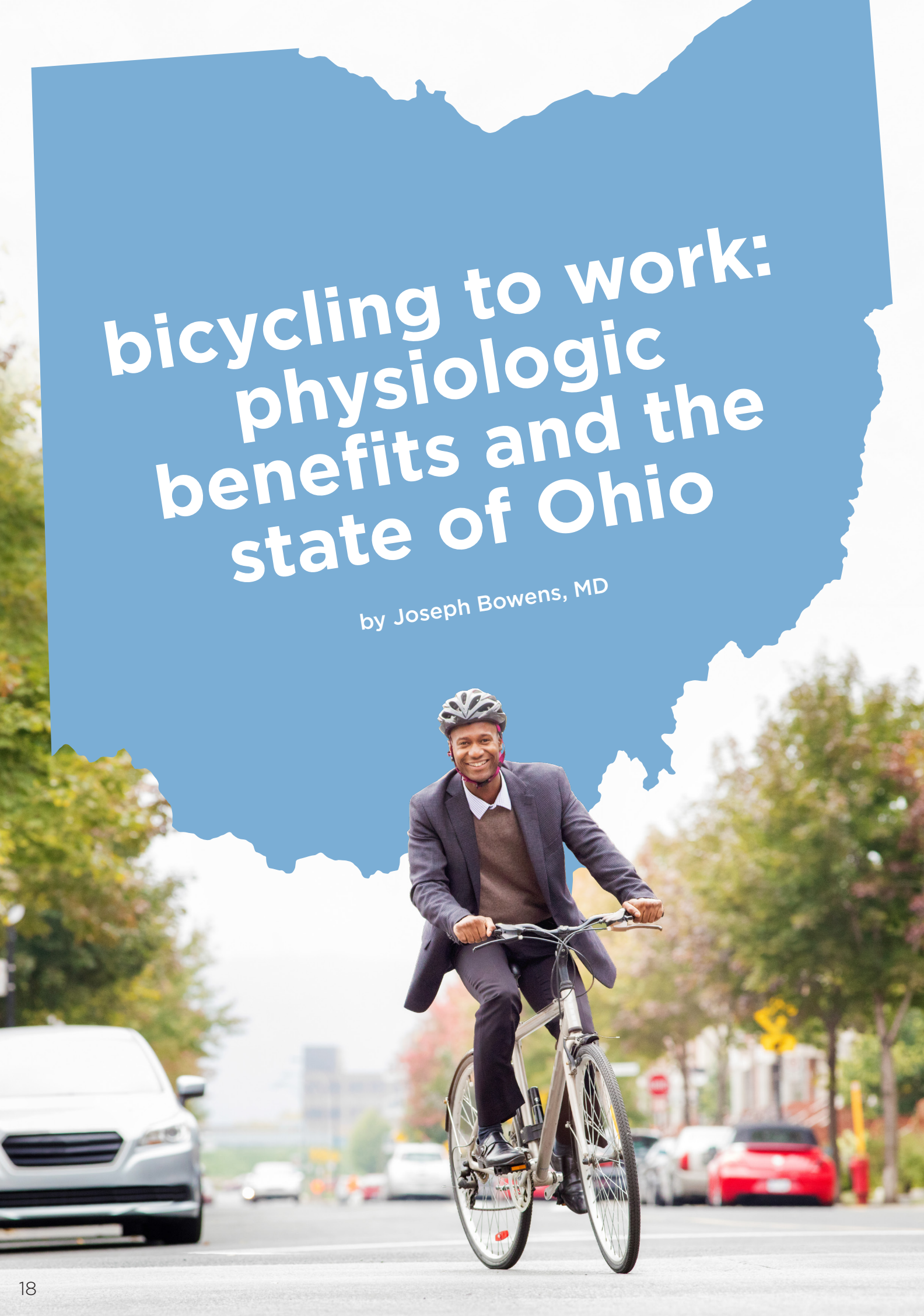
bicycling to work: physiologic benefits and the state of Ohio

by Joseph Bowens, MD



As of 2018, approximately 117 million American adults suffer from chronic diseases.[1] Of the 10 most common chronic diseases, seven are favorably influenced by regular physical activity.[1] However, 80% of United States adults do not meet the guidelines for physical activity as recommended by the Department of Health and Human Services (HHS).[1] It is estimated that $117 billion in annual health care costs is related to this lack of physical activity.[1] Current HHS guidelines recommend a minimum of 150 minutes per week of moderate-intensity physical activity for all capable Americans.[1] These recommendations are supported by strong evidence demonstrating numerous benefits of exercise, some of which include improvements in sleep, executive function, cardiovascular health, and physical function, while decreasing symptoms of anxiety and depression.[1] In 2016, the United States Surgeon General published "Step it Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities," to encourage Americans and communities to improve access to safe, alternative forms of transportation and to promote active transportation (AT), defined as any self-propelled human-powered mode of transportation, mainly walking and bicycling.[2,7] The Surgeon General identified AT as a way to incorporate the recommended minimum level of physical activity into one's daily routine, while also reducing carbon emissions, traffic congestion and noise pollution. This article will expand on the physiologic benefits of AT, specifically biking, the state of bicycle commuting in the U.S. and Ohio, and ways to make AT by bicycle a reality.

learning objectives

Following the completion of this article, the reader should be able to:

1. Define active transportation.
2. Identify physiologic benefits of active transportation.
3. Recognize Ohio's active transportation status.

evidence for active commuting

Numerous studies have examined the benefits of commuting via bicycle in European communities. For example, a population-based cohort study in England examined 22,450 adults over seven years for all-cause, cardiovascular, and cancer mortality.[3] Thirty percent of participants reported bicycling of any type, of which 26% reported bicycling for transportation. After controlling for confounding variables, bicycling for at least 60 minutes per week was associated with a 9% reduction in all-cause mortality.[3] It was also noted that those who bicycled between 1-59 minutes per week were more likely to participate in additional recreational physical activity.[3] Similar results were found in a prospective study investigating bicycling and the risk of coronary heart disease (CHD).[4] The authors, Blond et al., followed 53,723 adult Danes for 20 years. In the multivariable-adjusted analysis of overall bicycling, the risk of CHD was 11%-18% lower in cyclists versus non-cyclists.[4] Interestingly, this study did not find a significant difference between leisure-time bicycling and commuter bicycling.[4] However, it was noted that participants who changed their bicycling behavior (i.e. went from no bicycling to bicycling) from the first health assessment to the second health assessment, had a 26% lower CHD risk compared to those participants who did not participate in bicycling at either assessment.[4] Similar findings have been discovered in Danish children and adolescents, as those who bicycled to school were found to be significantly more physically fit than those students who walked or drove to school.[5] Furthermore, a World Health Organization tool called HEAT (Health Economic Assessment Tool), found a 28% reduction in all-cause mortality in adults who bicycled to and from work versus those who did not.[3] In a cohort of Chinese women, cycling for commuting purposes was inversely associated with all-cause and cancer mortality.[3]

While these studies are promising, they lack generalizability to the United States population due to differences in race, ethnicities, infrastructure, cultural norms, as well as varying cardiovascular risk profiles.[6] Several studies within the U.S. have utilized National Health and Nutrition Examination Survey (NHANES) data to investigate health benefits of active transportation. Furie and Desai examined NHANES data from 2007-2008 and 2009-2010 to find a relationship between cardiovascular disease (CVD) risk factors (body mass index [BMI], abdominal waist circumference, hypertension, diabetes, high-density lipoprotein [HDL] level) and active transportation. They found that 43% of the 9,933 participants did not meet minimum physical activity recommendations.[6] However, they found a significant inverse relationship between time spent in AT and mean BMI, mean waist circumference, and prevalence of both hypertension and diabetes.[6] Interestingly, Furie and Desai had a similar finding to the Blond et al. study which showed that those participants who did not meet minimum physical activity requirements, who then increased time spent in AT, had lower mean BMIs, smaller waist circumferences, and lower odds of both hypertension and diabetes.[6] A more recent U.S. study also utilized NHANES data from 2007-2016 to conduct an overall analysis of reported AT among 13,943 adults within a typical week.[7] Their findings showed that the prevalence of CVD risk factors generally decreased with increasing AT level.[7] More specifically, engaging in high AT levels (defined as greater than 150 minutes per week) was significantly inversely associated with hypertension, hypercholesterolemia, low HDL, diabetes and obesity.[7] Likewise, a study by Berger et al. showed Minnesota adults bicycling for AT had decreased odds of hypertension and obesity.[7] Gordon-Larsen et al. found walking or bicycling to work was inversely associated with blood pressure, triglyceride levels, insulin level, BMI and obesity in men living in Birmingham, Chicago, Minneapolis and Oakland.[7] Although many more studies are needed to establish the benefits and dose-response relationship between AT, these findings support the need for public policy and infrastructural changes to support and encourage AT in American communities.

international, U.S. and Ohio commuting profiles

European cities, such as the Netherlands, Denmark, Sweden and Finland, have the highest worldwide rates of bicycle commuting.[5] For example, 46% of 25-year-old men and women in Denmark commute to work via bicycle, and that percentage climbs as high as 70% during the summer months.[5] Here in the U.S., among 140 million workers, the percentage who participated in AT (bicycling or walking) from 2008-2012 was 3.4% (2.8% walking; 0.6% bicycling).[8] However, from 2000 to 2008-2012, the number of workers who commuted by bicycle increased by 60.8%, more than any other mode of transportation.[8] During that same time, Chicago showed the largest growth in commuting via bicycle by more than doubling its rate.[8] Portland, sits among the top of all American cities for most commuting bicyclists at a rate of 6.1%.[8] Interestingly, it was the only city in the U.S. where the rate of bicycle commuting exceeded the rate of walking.[8] According to data gathered by the U.S. Census Bureau, and similar to data analyzed from NHANES, the highest rates of bicycle commuting occurred in young men, aged 16-24 years (Figure 1).[4,6,8] They were more likely to identify as Hispanic or two or more races. From an educational standpoint, the most educated workers (graduate or professional degree) had the highest rate of bicycle commuting at 0.9%, followed by the least educated workers (without a high school diploma) at 0.7%.[8]

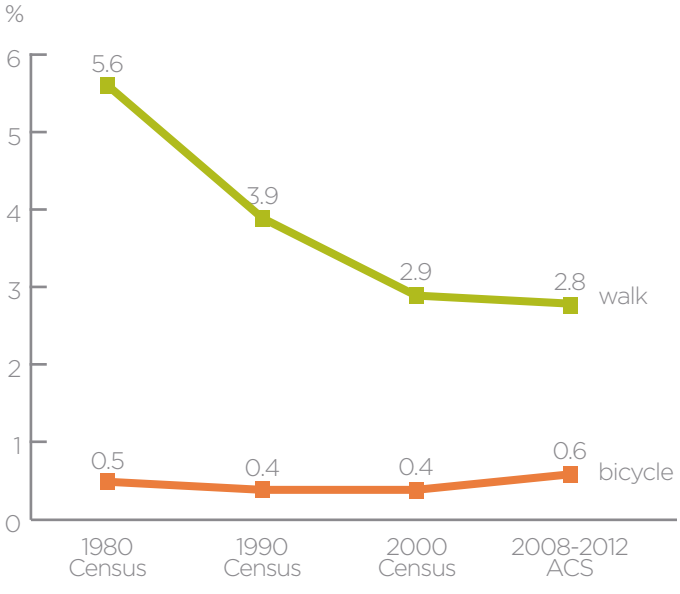


figure 1. Walking and bicycling to work: 1980-2012

(Data based on sample. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see census.gov/acs)

Sources: U.S. Census Bureau, Decennial Census, 1980, 1990, 2000; American Community Survey, 2008-2012

As for Ohio, the League of American Bicyclists identified the state No. 18 on its 2017 Bicycle Friendly State rankings (Figure 2).[9] This ranking has increased from 2008 to 2017, where Ohio's ranking fluctuated between 30-40.[9] These rankings were determined upon several factors, including infrastructure and funding, education and encouragement, legislation and enforcement, policies and programs, and evaluation and planning.[9] Dayton specifically earned a Bronze Medal in these categories (Figure 3).[9] Dayton was noted to have eight bicycling friendly businesses, no bicycling friendly universities, and 0.5% bicycle commuters out of a population of 140,478.[8] Dayton received positive recognition for an active bicycle advocacy group (Bike Miami Valley), bike to work month events, and a bike program staff to population ratio.[9] Reasons Dayton fell short of the Silver Medal were due to crashes per 10,000 bicycle commuters, bicycle education in schools, and overall ridership.[9] Of the other 18 cities identified in Ohio as Bicycle Friendly Communities, none earned a Silver or Gold Medal.[9]

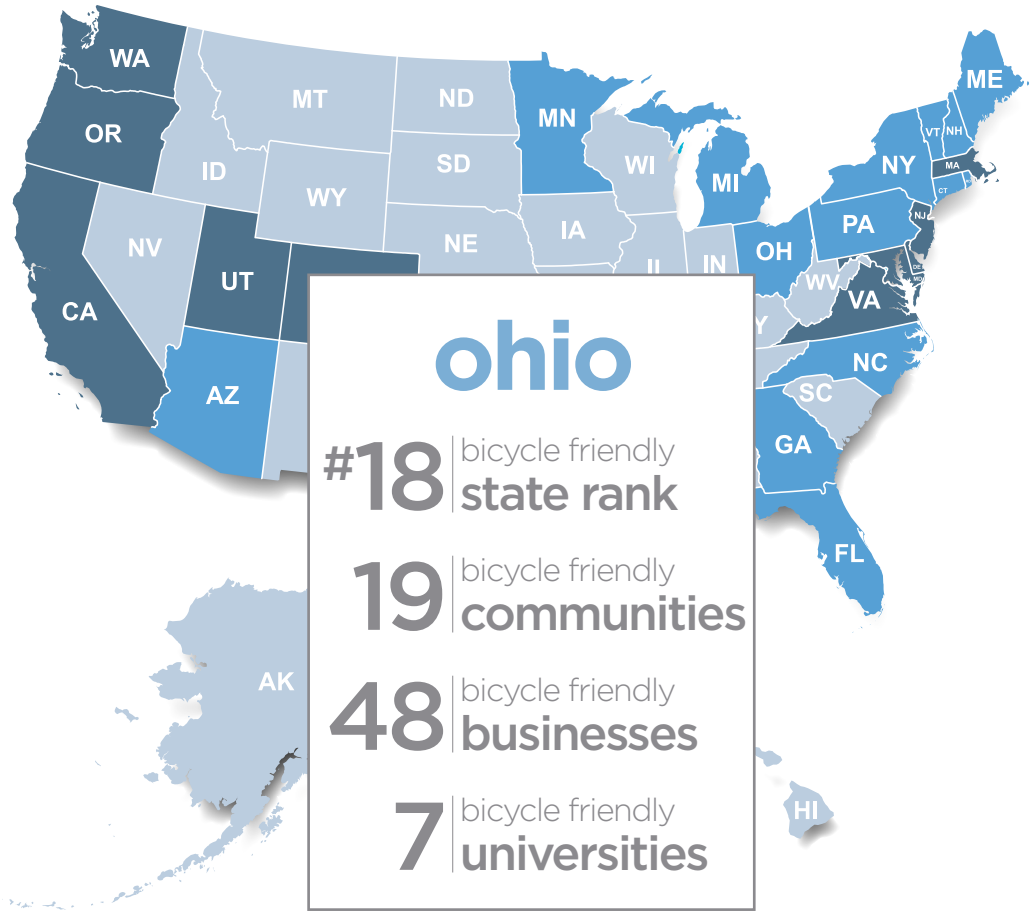


figure 2.

Dayton, Ohio

BICYCLE FRIENDLY COMMUNITY 2019-2023 BRONZE THE LEAGUE OF AMERICAN BICYCLISTS

Total population:	141,527	# of local bicycle friendly businesses:	8
Total area (sq. miles):	56.6	# of local bicycle friendly universities:	0
Population density:	2,543.1		

10 building blocks of a bicycle friendly community	*average silver*	*Dayton*
High speed roads with bike facilities	35%	0%
Total bicycle network mileage to total road network mileage	48%	9%
Bicycle education in schools	good	needs improvement
Share of transportation budget spent on bicycling	11%	15%
Bike month and bike to work events	good	very good
Active bicycle advocacy group	yes	yes
Active bicycle advisory committee	meets every two months	meets quarterly
Bicycle-friendly laws & ordinances	good	good
Bike plan is current and is being implented	yes	yes
Bike program staff to population	1 per 75k	1 per 28k

Category scores	
Engineering *Bicycle network and connectivity*	**4**/10
Education *Motorist awareness and bicycling skills*	**3**/10
Encouragement *Mainstreaming bicycling culture*	**5**/10
Enforcement *Promoting safety and protectng bicyclists' rights*	**6**/10
Evaluation & planning *Setting targets and having a plan*	**5**/10

Key outcomes
Ridership avg. silver: **2.7%** Dayton **0.4%** *Percentage of commuters who bike*
Safety measures | Crashes avg. silver: **537** Dayton **1,375** *Crashes per 10k bicycle commuters*
Safety measures | Fatalities avg. silver: **6.3** Dayton **42** *Fatalities per 10k bicycle commuters*

figure 3.

commuting to Dayton Children's

Commuting by bicycle to Dayton Children's is easier than you might expect. As the winter season approaches, it is a good time to start preparing to commute to work in the springtime. When selecting a bicycle, a great commuter bicycle should be affordable, comfortable and reliable. Clothing choice is important to consider, especially depending on the length of your commute. Clothing should be breathable and allow for mobility. If your commute is fairly short, wearing work clothes will do. Be sure to check the weather and carry a light rain jacket. While accessories such as fenders or racks for panniers (bicycle bags) aren't necessary, they can make the trip easier, particularly if you plan on transporting numerous or heavy items to work. Front and rear lights are crucial for your safety, especially as the days get shorter. Like all bicycling accessories, the price ranges vary, but the USB rechargeable lights tend to be more powerful and are conveniently rechargeable at work. Choose your route ahead of time and give it a test ride on a day off. Dayton Children's is accessible by large, visible bike lanes on Valley Street, which is most easily accessed from the Mad River Trail. The Mad River Trail is accessed from the south by the Dayton-Kettering Connector, from the east by the Creekside and/or Iron Horse Trail, and from the north by the Stillwater and/or Great Miami River trail. There is bicycle parking in the parking garages. Be sure to have a strong lock, such as a U-lock with a cable, to ensure your bike's safety. And of course, always wear your helmet.

summary

The physiologic benefits of bicycling to work have been demonstrated in many European studies and several recent U.S. studies. Bicycling to work has been shown to decrease cardiovascular disease risk, prevalence of some chronic diseases, and all-cause mortality. More U.S. studies need to be performed to further demonstrate the value of active transportation, which can shape and drive changes, policies, and build environments to encourage its use.

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Joseph Bowens, MD, is a second-year pediatric resident from Libertyville, Illinois. He attended Creighton University School of Medicine in Omaha, Nebraska, where he began commuting and racing bicycles. When he is not at work, he enjoys watching the Cubs, attending concerts, and spending time with his co-residents.

CME questions

9. What is the recommended level of physical activity for adults as outlined by the Department of Health and Human Services?

a. 75 minutes/week of low-intensity exercise

b. 150 minutes/week of low-intensity exercise

c. 150 minutes/week of moderate-intensity exercise

d. 300 minutes/week of vigorous-intensity exercise

10. Bicycling to work has been shown to decrease which of the following:

a. All-cause mortality

b. Odds of diabetes and hypertension

c. Mean waist circumference and BMI

d. All of the above

11. Which U.S. demographic has the highest rate of bicycling to work?

a. Highest education level (graduate or professional degree)

b. Ages 45-65

c. Suburban workers living outside a metropolitan area

d. Women

Dayton Children's updates

Dayton Children's verified as a Level 1 Pediatric Trauma Center by the American College of Surgeons

The American College of Surgeons (ACS) officially verified Dayton Children's Hospital as a Level 1 Pediatric Trauma Center on November 6, 2019. This is the highest level attainable, proving once again to parents that they can rely on Dayton Children's to provide the best care for their child, even in the toughest circumstances.

"This verification highlights the extreme commitment that Dayton Children's trauma team, led by Jeffrey Pence, MD, trauma medical director, and Lisa Schwing, RN, trauma program manager, has to every level of care in some of the most critical circumstances," says Deborah Feldman, president and CEO for Dayton Children's. "They not only treat the injuries, but provide long-lasting healing for body and soul. The emotional damage for both child and family can be significant, so we work with the community to prevent children from getting hurt in the first place. Our trauma providers live our mission of the relentless pursuit of optimal health for every child within our reach."

Dayton Children's receives the 2020 women's choice award

Dayton Children's Hospital has been named as a Best Children's Hospital and Best Pediatric Emergency Care by the Women's Choice Award®, America's trusted referral source for the best in health care.

The list of 29 award winners, including Dayton Children's represents hospitals that have met the highest standards for children's health care.

"At Dayton Children's, parents and guardians know we treat their children as if they are our own," says Deborah A. Feldman, president and CEO of Dayton Children's Hospital. "We are honored that the Women's Choice Award proves that trust."

Cincinnati Shriners Hospital takes next steps in relocation to Dayton

Following a nine-month period of exploration, Shriners Hospitals for Children–Cincinnati is pleased to announce that all contract and construction plans have been approved related to its relocation to the campus of Dayton Children's Hospital.

In March 2019, leadership of the two pediatric health care organizations publicly announced that they were seeking to pursue a "hospital within a hospital" arrangement, with a goal of relocating the services of Cincinnati Shriners Hospital to the Dayton campus. The 51-year-old Cincinnati institution provides all levels of pediatric burn treatment, as well as cleft lip and palate, plastic and reconstructive surgery for children up to age 18, regardless of a family's ability to pay.

The new location will allow Shriners Hospitals for Children to maintain its southwest Ohio presence with a surgical facility designed to meet and exceed today's medical standards for its pediatric specialty care, while gaining operational efficiencies by partnering with Dayton Children's and purchasing some services.

new brain tumor clinical trial available to children in Dayton region

Children with cancer in the Dayton region now have access to a clinical trial that aims to improve the quality of life and survival rates from several of the most common types of malignant brain tumors, thanks to a recent partnership between Dayton Children's Hospital and Nationwide Children's Hospital, in Columbus, Ohio.

The Head Start 4 protocol uses an innovative approach with newly diagnosed young children with medulloblastoma and other central nervous system tumors to find better treatments and outcomes. The availability of this clinical trial is one of the first official endeavors in the cancer, blood disorder and bone marrow transplant collaborative that the hospitals announced in January 2019. The goal of the alliance is to enhance services, create more research opportunities for both institutions and allow more patients from the Dayton region to stay closer to home during treatment. Patients in the Dayton area will now have access to protocols centered around personalized medicine and the opportunity to understand genetic material and its effect on their health.

Patients are being recruited for the clinical trial. Currently 95 children are enrolled with room for 155 more. It is the only study of its kind underway right now in the country and collaborating institutions include Children's Hospital of Philadelphia, John's Hopkins and Children's National.

"We are always working to find ways to make life a little better for our children," says Ayman El-Sheik, MD, chief, division of hematology and oncology at Dayton Children's Hospital. "It is through research and trials like this that we can continually offer a better solution tomorrow than we did yesterday."

coronavirus (SARS-CoV-2/COVID-19) update

information as of April 15, 2020

COVID-19 background

COVID-19 is caused by a new coronavirus. Coronaviruses are a large family of viruses that are common in people and many different animals, including camels, cattle, cats and bats. Rarely animal coronaviruses infect people and then spread between people. But MERS-CoV and SARS-CoV, and now with this new virus, SARS-CoV-2 that causes COVID-19, we are seeing this can occur. All three of these viruses have their origins in bats. The SARS-CoV-2 recently emerged from such an animal reservoir.

Early on, many of the patients at the epicenter of the outbreak in Wuhan, Hubei Province, China had some link to a large seafood and live animal market, suggesting animal-to-person spread. Later, a growing number of patients reportedly did not have exposure to animal markets, indicating person-to-person spread. Person-to-person spread was subsequently reported in other countries, including in the United States. Most nations now have ongoing community spread of the virus that causes COVID-19, as does the United States. Community spread means some people have been infected and it is not known how or where they became exposed.

situation in U.S.

- Different parts of the country are seeing different levels of COVID-19 activity.
- The duration and severity can vary depending on the characteristics of the virus and the public health response.
- All 50 states have cases of COVID-19.U.S.
- COVID-19 cases include:
  - Imported cases in travelers
  - Cases among close contacts of a known case.
  - Community-acquired cases where the source of the infection is unknown.
- All U.S. states are reporting community spread of COVID-19.

steps we are taking to stop the spread at Dayton Children's

social distancing

Avoiding close contact with others. The CDC recommends keeping at least 6 feet distance between you and your peers.

social masking

Most recently the CDC made the recommendation for anyone going out in public to wear a mask. Consider wearing cloth face coverings in public settings where social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies). Cloth face coverings may be made from common materials at low cost. At Dayton Children's all staff and visitors over the age of 2 are being masked during our screening process. Studies are showing that a person can transmit the virus to others before showing symptoms. Therefore implementing social masking protects visitors and staff against the possible spread of infection.

virtual visits

We are now offering patient families the option to do their upcoming clinic appointment as a visit by video or phone call.

visitor restrictions

We are limiting visitors to one adult caregiver. Inpatient stays are allowed one adult caregiver at a time, but one additional caregiver can switch in and out during the stay. No other visitors will be permitted, including siblings. These restrictions apply for both clinic appointments and inpatient stays.

stay up to date on the latest coronavirus information

CDC, NIH, WHO and Johns Hopkins are closely monitoring the SARS-CoV-2 pandemic. Be sure to check the resources below for the latest information.

Stay in touch with your local and state health departments.

Please feel free to contact the division of infectious disease at Dayton Children's at 937-641-3329 if you have any questions or need additional information.

related Links

- CDC's COVID-19 gateway page: CDC.gov/coronavirus
- NIH's Coronavirus (COVID-19) gateway page links to news releases on vaccine trials: **nih.gov/health-information/coronavirus**
- WHO's Coronavirus Disease (COVID-19) Outbreak gateway page links to WHO's Situation Reports web page: **who.int/emergencies/diseases/novel-coronavirus-2019**
- Johns Hopkins' Coronavirus Resource Center gateway page links to the Coronavirus COVID-19 Global Cases CSSE web page: **coronavirus.jhu.edu/**
- The Ohio Department of Health's coronavirus site COVID-19 (Novel Coronavirus) - Ohio provides statewide data and recommendations: **coronavirus.ohio.gov/wps/portal/gov/covid-19/home**

program evaluation

1. The material presented in this publication met the mission to enhance health care delivery in our region through education based on the essentials and policies of the Accreditation Council for Continuing Medical Education.
   ☐ Strongly agree ☐ Agree ☐ Neutral
   ☐ Disagree ☐ Strongly disagree

2. Did the material presented in this publication meet the educational objectives stated?
   ☐ Yes ☐ No

3. Did the material presented in this publication have a commercial bias?
   ☐ Yes ☐ No

4. Please rate the contents of this issue using the following scale:
   1 = Poor, 2 = Fair, 3 = Good, 4 = Very good, 5 = Excellent *(Circle one response for each.)*

	Poor				Excellent
Timely, up-to-date?	1	2	3	4	5
Practical?	1	2	3	4	5
Relevant to your practice?	1	2	3	4	5

5. Please describe any changes you plan to make in your clinical practice based on the information presented in this program.

   _____

6. Are there any other topics you would like to have addressed in this publication or future educational programs for health care providers?
   ☐ Yes ☐ No If yes, please describe:

   _____

7. Please describe how you will incorporate information obtained from this publication into your practice.

   _____

8. Letter to the editor — Letter to the editor may be emailed to alters@childrensdayton.org or attached to this evaluation and may be published in the next issue.

physician accreditation statement and credit designation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Wright State University (WSU) and Dayton Children's Hospital.

WSU designates this Journal-based CME Activity for a maximum of 4 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

program test

to obtain CME credit you must:

Read and reflect on each article.

Answer the questions from each article and complete this test — http://cmequiz.childrensdayton.org/Winter2020PedForum. 70 percent correct answers are needed to obtain the full 4.0 AMA PRA Category 1 Credits™.

Complete the program evaluation.

Return your completed test and program evaluation by email, mail or fax to: Sue Strader, coordinator
Department of Continuing Medical Education
Dayton Children's Hospital, One Children's Plaza,
Dayton, Ohio 45404-1815
Fax: 937-641-5931

E-mail: straders@childrensdayton.org

Take test online: childrensdayton.org/providers

This test must be received by December 31, 2020 for the credit to be awarded

pediatric forum | volume 34, issue 1

your answers to CME questions
(Please circle the BEST answer.)

1.	true	false			
2.	true	false			
3.	a	b	c	d	e
4.	a	b	c	d	e
5.	a	b	c	d	e
6.	a	b	c	d	e
7.	a	b	c	d	
8.	a	b	c	d	e
9.	a	b	c	d	
10.	a	b	c	d	
11.	a	b	c	d	

please type or print clearly

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practice name _____

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city _____

state/zip code _____

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office fax _____

e-mail _____

signature _____

pediatric forum

winter 2020

One Children's Plaza
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Pediatric Forum is produced for the professional staff and referring physicians of Dayton Children's by the marketing communications department.

The purpose of Pediatric Forum is to provide information and news about pediatric health care issues and to provide information about clinical services and management issues of Dayton Children's.

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obtaining CME credit

To obtain CME credit, read, reflect on articles, complete the evaluation and answer at least 70 percent of the quiz correctly. Send the answer sheet and program evaluation to:

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Fax 937-641-5931
Email straders@childrensdayton.org

Take quiz online: childrensdayton.org/providers

The answer sheet and program evaluation must be received by December 31, 2019, for the credit to be awarded.

sponsorship/accreditation information

author information

It is the policy of Wright State University to ensure balance, independence, objectivity and scientific rigor in all educational activities.

All authors contributing to our programs are expected to disclose any relationships they may have with commercial companies whose products or services may be mentioned so that participants may evaluate the objectivity of the program. In addition, any discussion of off-label, experimental or investigational use of drugs or devices will be disclosed by the authors. Contributing authors reported the following:

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Dr. Bowens does not plan on discussing unlabeled/investigational uses of a commercial product.

target audience

This education activity is designed for pediatricians, family physicians and related child health care providers.

educational objectives

- Identify the four pediatric issues covered in this journal and develop appropriate intervention.
- Appropriately use the resources of Dayton Children's Hospital to improve patient care.

dayton children's

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