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Bronchiolitis: An Update

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Bronchiolitis is the number one cause of hospital admission for infants in the United States.^{1,2} Every year during bronchiolitis season, waiting rooms and emergency departments (ED) are overrun with wheezing, runny-nosed infants and toddlers. In the fall of 2014, the American Academy of Pediatrics (AAP) revised its 2006 clinical guideline for the diagnosis and management of this common condition with the goal of providing evidence-based recommendations for previously healthy children one to 23 months of age.

Bronchiolitis is commonly caused by a viral lower-respiratory-tract infection. Respiratory syncytial virus (RSV) is the most common cause with additional etiologies including human rhinovirus, human metapneumovirus, adenovirus, parainfluenza virus, and influenza. Co-infection occurs in up to one-third of infants. The epithelial cells lining the small airways become inflamed and necrotic. Sloughing of the cells combined with edema and increased mucous



production leads to airway obstruction. The disease typically begins with rhinitis and cough, progressing to tachypnea, wheezing, crackles, and/or retractions. Fever is variable, but if present, generally low grade. Physical findings vary during the course of the illness, making assessment of severity challenging. Populations at risk for severe disease include infants less than three months of age, exposed to second-hand smoke, with a history of prematurity, and those with cardiopulmonary disease and/or immunodeficiency.

The AAP guideline stresses that bronchiolitis is a clinical diagnosis. The routine use of chest radiographs or laboratory studies including viral testing is discouraged. Abnormalities on chest radiograph, such as atelectasis, may be misinterpreted as a bacterial infection and treated unnecessarily with antibiotics.

Over the years, many treatment options have been explored, but none have consistently or overwhelmingly proven to be effective. The mainstay of treatment is supportive, with focus on feeding, hydration, respiratory support, and nasal suctioning.

Bronchodilators, including albuterol and salmeterol, should not be used to treat viral bronchiolitis. The previously described option of a β -agonist trial has been removed in the updated guideline. Data is lacking to show consistent benefit. Several studies have shown that clinical respiratory scores may

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transiently improve, but length of stay (LOS), need for hospitalization, or duration of symptoms is not affected.

A meta-analysis demonstrated a small but significant reduction in hospitalization rates for infants and children receiving epinephrine compared to placebo. The reduction occurred on the day of presentation to the ED only. Use in the inpatient setting did not shorten LOS. The use of epinephrine in the inpatient or outpatient setting is not recommended.

Nebulized hypertonic saline may be beneficial in the inpatient setting. Hypertonic saline is thought to absorb mucosal water, decreasing edema, and improving mucociliary clearance. The most recent meta-analysis found that use for more than 24 hours improves clinical symptoms and reduces LOS when duration of hospital stay is longer than three days, which exceeds the average LOS in the United States. Since then, two randomized controlled trials have been published that showed no benefit from the use of hypertonic saline. Most recently, a systematic review reported a reduction in mean LOS by almost half a day though study results were highly variable and some studies may have been subject to selection bias.

Antibiotics, systemic corticosteroids and/or chest physiotherapy are not beneficial and should not be used for the treatment of viral bronchiolitis. Systemic steroids alone do not decrease admission rates nor shorten LOS. Atelectasis is common in bronchiolitis but the use of chest percussion, even

vibratory, is not helpful. Antibiotics are overused in bronchiolitis, especially among young febrile infants (< three months of age), due to the concern of an occult bacterial infection. Studies have shown the likelihood of bacteremia or bacterial meningitis in young febrile infants with bronchiolitis is incredibly low. The risk of a concurrent urinary tract infection has been reported as high as seven percent though this may represent asymptomatic bacteruria as a concurrent positive urinalysis was not required for diagnosis in most studies. Whether or not to administer supplemental oxygen to infants and children with oxyhemoglobin



saturation greater than 90 percent or use continuous pulse oximetry during hospital admission is up to the provider. Transient hypoxemia is common in healthy infants but its long-term effect during acute illnesses such as bronchiolitis is unknown. Using continuous pulse oximetry during hospital admission may not be beneficial and can lead to a prolonged stay. The use of home oxygen has been shown to shorten LOS and decrease admission rates at higher altitudes. Outpatient providers report difficulty knowing when to stop the oxygen and the number of follow-up visits for infants discharged on oxygen may increase. The use of

high flow nasal cannula has become popular in the management of bronchiolitis. Its use has been shown to clinically reduce work of breathing and may decrease the need for intubation.

New palivizumab (Synagis®) recommendations include that for the majority of infants prophylaxis is only recommended during the first year of life. Premature infants born after 29 weeks gestation without chronic lung disease do not qualify. Prophylaxis should be discontinued if the infant becomes infected with RSV.

The final recommendation emphasizes education. Healthcare providers are responsible for educating each other and families that less is more when caring for an infant or child with bronchiolitis. With symptoms lasting up to three weeks, families often seek care multiple times during the course of the illness, and it is important that we all provide the same message.

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Navigating the Diagnostic Course for Autism Spectrum Disorder

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Navigating systems of care before, during, and after an autism diagnosis is made can be an overwhelming experience for families. With this article, we aim to walk healthcare professionals through the basic process so they can best prepare families if an autism spectrum disorder (ASD) is suspected.

Screening for Autism Spectrum Disorder and Accessing Early Intervention

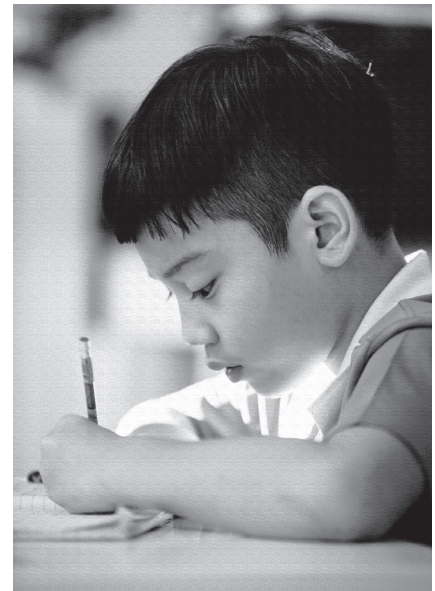
The American Academy of Pediatrics (AAP) recommends that children be screened for general development using standardized, validated tools at nine, 18 and 24, or 30 months, or whenever a parent or provider has a concern. The AAP also recommends that children be screened for autism at 18 and 24 months, or whenever a parent or provider has a concern.¹

Screening tools focus on developmental and behavioral milestones and are identified as Level 1 and Level 2. Level 1 screening tools are designed to be administered to all children whether there is a concern about development delays or not (e.g., a well-child visit at the pediatrician's office). Level 2 screening tools are administered to children who have been identified as at risk of having a developmental delay or disability. Level 2 screening tools specific to ASD, such as the Screening Tool for Autism in Toddlers and Young Children

(STAT), help to better identify children at risk of having ASD.

The Center for Disease Control and Prevention's (CDC) "*Learn the Signs. Act Early.*" program aims to improve early identification of children with autism and other developmental disabilities so children and families can get the services and support they need.² The CDC offers a wealth of free resources for ages birth to five years. The resources are available for families and healthcare and early childhood providers. Some materials available include: *Watch Me!* training, developmental milestone handouts so families can track their child's progress, and Autism Case Training web-based modules offering free CME, MOC, CNE, or CEU credits.

The Iowa Regional Autism Assistance Program (RAP)³ offers support and services, including screening, for Iowa's children with Autism Spectrum Disorder and their families. They also offer support and services for children who have screened positive, and are waiting for an autism diagnostic evaluation. RAP teams consist of Advanced Registered Nurse Practitioners (ARNPs), Registered Nurses (RNs), and Family Navigators (FNs). RAP serves Iowa's children and youth ages 0-21 and their families.



The RAP teams use standardized screening tools, both Level 1 and Level 2, to identify children at risk for ASD and help to find diagnostic services. RAP team members can also offer families a listening ear by offering family-to-family support. All Family Navigators with CHSC are parents or primary caregivers of a child or youth with a special healthcare need. The RAP teams help Iowa families access ASD services in their local area. They coordinate care based on the families' needs and goals and are committed to helping them connect to the level of support each family desires.

Confirmation of a diagnosis is not an eligibility requirement for Early ACCESS (Iowa's Part C birth to three intervention services). If there are

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Autism Spectrum Disorder

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concerns, families should seek intervention services as soon as possible.

Evaluating for Autism Spectrum Disorder

Autism Spectrum Disorder can be diagnosed by a variety of mental health and medical professionals. Sometimes providers work on their own when evaluating a child for ASD, but oftentimes they work in multidisciplinary diagnostic teams. A typical team is comprised of a developmental pediatrician or child psychiatrist, a psychologist, and a speech-language pathologist. Occupational therapists, audiologists, and social workers are also common diagnostic team members. The evaluation can take place across multiple appointments or can be completed in the course of one day or less. Regardless of format, there are several tasks that are ideally completed as part of the assessment process, including diagnostic interviewing, completing a structured observation, and reviewing/obtaining information on the individual's developmental functioning, including cognitive and language functioning. These tasks are discussed below:

Diagnostic interviewing:

Families are thoroughly interviewed about the child's communication and social deficits as well as the child's restricted interests and repetitive behaviors. Both present and past concerns are considered. Oftentimes teachers/daycare providers are also briefly interviewed.

Structured observation:

Most children complete a semi-structured observation, especially when it is unclear if the child has



Iowa Regional Autism Assistance Program

RAP teams help families with:

- Navigating the education system
- Exploring insurance coverage and payment options for Applied Behavior Analysis and other needs
- Communicating with diagnostic facilities and healthcare providers
- Finding an advocacy or family support group
- Connecting to ASD resources and information

autism from the interview and informal observations alone. The "gold standard" measure is the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2). ADOS-2 activities elicit behaviors pertinent to the diagnosis (e.g., eye contact, play and imaginative skills, initiation of social games). Behavioral observations are then scored according to specific guidelines. ADOS-2 activities vary by the child's age and language abilities.

Obtaining estimates

of developmental functioning:

Autism diagnosticians will frequently need to review or obtain cognitive, language, and other developmental evaluations (e.g., adaptive functioning, motor functioning) in order to contextualize the social communication deficits demonstrated by the child. These estimates can also be important for intervention planning as well as for making a differential diagnosis.

After the above has been completed, the provider(s) must reflect on their findings with DSM-5 symptoms of Autism Spectrum Disorder in mind. Once a diagnostic decision has been made, the results of the evaluation and the diagnosis are shared with the family, along with recommendations for intervention and resources for support.

Identifying Appropriate Services and Supports for the Patient and their Family

The appropriateness of specific intervention services depends greatly on the age of the child, their developmental functioning, the severity of their autism symptoms, and whether or not they have any co-occurring diagnoses. There are now many evidence-based interventions for individuals with

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Navigating the Diagnostic Course for Autism Spectrum Disorder



Birth to Five Years of Age

Early ACCESS

(ages birth to under three years of age):
<http://www.iafamilysupportnetwork.org/early-access-iowa/what-is-ea>

First Five model supports health providers in the earlier detection of social-emotional and developmental delays and family risk-related factors in children birth to five years, as well as coordination of referrals, interventions, and follow up.
<http://www.idph.iowa.gov/1stfive>

Center for Disease Control and Prevention (CDC), Learn the Signs. Act Early. Program:
<http://www.cdc.gov/ncbddd/actearly/> and
<http://firstsigns.org/healthydev/milestones.htm>

Help Me Grow:
<http://www.helpmegrownational.org/>

Over Three Years of Age
Iowa Area Education Agency
(over three years of age):
<http://www.iowaaea.org/>

Family-to-Family Support:
ASK: <http://askresource.org/>

Family Voices:
<http://www.familyvoices.org/states>

Iowa Regional Autism Assistance Program:
<http://www.chsciowa.org/regional-autism-assistance-program.asp>

Additional Resources

Autism Society of Iowa:
<http://autismia.com/>

Autism Speaks:
<https://www.autismspeaks.org/>

Autism Support Program:
<http://www.magellanoofowa.com/benefits-and-services-ia/autism-support-program.aspx>

Bright Futures:
<https://brightfutures.aap.org/>

CDC, Pediatric Developmental Screening Flow Chart:
<http://www.cdc.gov/ncbddd/childdevelopment/documents/screening-chart.pdf>

Iowa COMPASS:
www.iowacompass.org/

Screening Tools for Parents/Primary Caregivers to share with their Providers

Easter Seals, through support from the CVS Caremark Charitable Trust, provides parents with FREE access to the Ages & Stages Questionnaires®, Third Edition, one of many general developmental screening tools.
<http://www.easterseals.com/mtffc/asq/>

MCHAT:
https://www.m-chat.org/_references/mchat.dotorg.pdf

**Please note this is not a comprehensive list of available resources.*



Bronchiolitis *(brawn-key-oh-LIE-tus)*

Bronchiolitis is:

- An infection of the lungs that causes fever, cough, and wheezing
- Caused by viruses or germs
- Very common

Bronchiolitis is not:

- Asthma
- Helped by antibiotics
- Diagnosed by blood tests or x-rays

What you can do:

- Let the illness run its course
- Treat symptoms
- Offer shorter, more frequent feedings
- Wash your hands frequently and well
- Avoid all tobacco smoke

When to call your doctor:

- Your child is having a harder time breathing
- Your child isn't eating well or having as many wet diapers
- You have questions or worries

Bronchiolitis

is a very common lung infection in children less than two years old. If your child is otherwise healthy, bronchiolitis is not much to worry about. The wheezing cough will usually go away on its own in two to four weeks. Sometimes children with bronchiolitis get worse before they get better.

There is no medicine for bronchiolitis. You may make your child feel better by suctioning their nose with saline drops and a bulb syringe. If your doctor says it's okay, you can treat your child's pain and fever with ibuprofen or acetaminophen.

Autism Spectrum Disorder

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autism. Examples of interventions with research support include applied behavior analysis (ABA), naturalistic developmental behavioral interventions, social skills interventions, speech/language therapy and other communication interventions (e.g., augmentative and alternative communication (AAC), and medication management).

Autism Support Program:

Legislation in 2013 created the statewide Autism Support Program (ASP). This legislation established a fund to provide ABA services for some Iowa children less than nine years of age with a diagnosis of Autism Spectrum Disorder (ASD). This legislation ensures that eligible children with ASD will benefit from early, intense, and effective interventions. Children who qualify may receive \$36,000 per year for ABA services, for a maximum of 24 months. The following eligibility requirements must be met:

- Child under age nine at time of application
- An Autism diagnosis is provided by a child psychiatrist, developmental pediatrician, or clinical psychologist within 24 months of the date of the application.
- Child does not qualify for ABA coverage under Medicaid or ABA coverage under a commercial insurance plan
- Household income under 400 percent of the Federal Poverty Level

University of Iowa Children's Hospital (UICH) Autism Center⁴ serves as a statewide resource for families and providers, offering

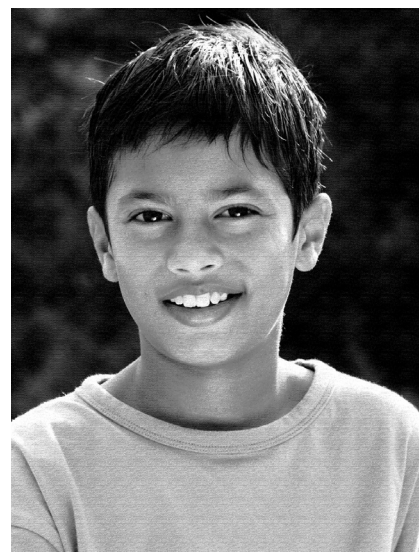
comprehensive assessments and treatment recommendations including:

- Team evaluations for diagnosis
- Medication management
- Behavioral assessment
- Early intervention: Teaching play and communication skills to young children with autism
- Evaluating academic and learning problems, including intellectual disability
- Evaluating speech and language, feeding, and sleep disorders
- Evaluating daily living skills, such as eating, dressing, and walking
- Evaluating assistive technology needs
- Evaluating and treating adults with autism spectrum disorders

UICH Autism Center also assists with follow-up care by working collaboratively with the Regional Autism Assistance Program and community providers to connect families with available resources and provides free trainings on a variety of autism-related topics, presented by local leaders in this field.

Conclusion

Obtaining an accurate diagnosis is only one step of many that must be completed when an autism spectrum disorder is suspected. Prior to the diagnostic evaluation, the child can be screened by healthcare professionals or early interventionists. Early intervention services can be initiated prior to



a formal diagnosis being made. After the diagnosis is made, additional evidence-based services and supports can often be identified to help the child and their family.

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3. Child Health Specialty Clinics, Iowa Regional Autism Assistance Program (RAP): <http://www.hscsiowa.org/regional-autism-assistance-program.asp>
4. Autism Center, University of Iowa Children's Hospital: <http://www.uichildrens.org/autism/>



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