Concussion Game Plan
6-phase return-to-play protocol

40.5% of concussed athletes returned to play too soon

395,274 concussions in US high schools/yr

Back to school with Dr. Farber
Keys to school readiness
Suicide attempts spike in fall

GUEST EDITORIAL
3 steps mitigate med mistakes

JOURNAL CLUB
Effects of screen time on well-being

PUZZLER Macroglossia and omphalocele
# Contemporary Pediatrics

## Our Mission
Office- and hospital-based pediatricians and nurse practitioners use Contemporary Pediatrics’ timely, trusted, and practical information to enhance their day-to-day care of children. We advance pediatric providers’ professional development through in-depth, peer-reviewed clinical and practice management articles, case studies, and news and trends coverage.

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As the start of another school year approaches, parents and their children are going through their checklist to prepare for that first day. Likely one of those check boxes includes a trip to the doctor for a checkup and possibly receiving some vaccines.

As we know, pediatric patients are at risk for medication errors in both the office setting and when patients are under the supervision of caregivers. Reported medication errors in children, to name a few, include wrong medications prescribed due to inadequate medication histories and/or look-alike/sound-alike characteristics; dose calculation errors attributable to availability of multiple concentrations of a medication; and wrong vaccine administrations. This article will review some steps that primary care providers (PCPs) can take to ensure safe medication use in the pediatrician’s office and at home, daycare, and at school, as needed.

**Vaccine safety**

The Institute of Safe Medication Practices (ISMP) recently published a 2-part series highlighting national vaccination errors.1,2 Among the vaccine errors reported to the ISMP National Vaccine Errors Reporting Program in 2017, the most prevalent were wrong vaccine, wrong dose, expired vaccines, and wrong age.

Wrong vaccine errors are attributable to similar generic vaccine names, abbreviations, and vaccine packaging.

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<td>- Failure to verify the patient’s age prior to administration</td>
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<td>- Unfamiliarity with dosing of vaccines.</td>
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<th>Vaccines frequently implicated in these mix-ups are:</th>
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<td>- Diphtheria, tetanus, and/or pertussis vaccines</td>
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<td>- Measles, mumps, rubella, and/or varicella vaccines</td>
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<td>- Hepatitis A, hepatitis B, and combination vaccines</td>
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In the case of pneumococcal vaccines, at times there is confusion regarding what serotypes Prevnar 13 (PCV13) covers versus Pneumovax 23 (PPSV23). The 23-valent product contains 12 of the serotypes included in PCV13 plus 11 additional serotypes and isn’t necessarily better than the 13-valent product because it covers more serotypes. The 13-valent product is conjugated, providing more immunological durability and better protection against those serotypes prevalent for meningitis, which the 23-valent product does not.
Certain conditions such as asplenia necessitate the need for both vaccinations. Errors also have been attributed to administering diluents without the reconstituted associated active vaccine component (eg, ActHIB) as well as administering only 1 component of a 2-component vaccine (eg, Pentacel).

To mitigate vaccine errors associated with ordering, standardized protocols/order sets should be developed and orders should include the full generic name, brand name, and the Centers for Disease Control and Prevention (CDC) standard abbreviation of each vaccine. Categorizing vaccines by the associated age at which they should be administered can facilitate ordering the right vaccine and right dose for the right age.

Vaccine administration errors also can be mitigated with improved vaccine storage and staff education and training. Improved storage recommendations include separating adult and pediatric formulations of the same vaccine; separating vaccines with similar names/abbreviations; utilizing auxiliary labels to highlight vaccine diluents and 2-component vaccines; and keeping these components stored together when possible. In addition, use of barcoded medication administration should be encouraged when possible.

**Update patients’ medication lists**

Children with chronic conditions often are at risk for fragmented care because of the multiple providers that they see. For PCPs and specialists, it’s imperative that patients’ medication lists stay up-to-date to prevent unintended consequences such as caregiver/patient confusion at home and potential errors upon admission to the hospital.

Obtaining an accurate patient history is time consuming, but eliciting help from a nurse or, ideally, a pharmacist can help ensure that the list reflects what children are prescribed and, more importantly, actually taking at home. Potential pitfalls in this process include errors associated with look-alike/sound-alike medications, duplication of therapy, and confusion about a patient’s dose given multiple concentrations available.
Risks associated with this were demonstrated by an error involving a pediatric patient prescribed phenytoin. Upon discharge from the hospital, the patient was prescribed 6 mL of a phenytoin 30-mg/5-mL solution to be given 3 times a day and provided with an oral syringe marked for 6 mL. The outpatient pharmacy, however, dispensed a 125-mg/5-mL solution to administer 1.4 mL 3 times a day. Two days later, the patient presented to the emergency department with signs of phenytoin toxicity, and the mother reported giving 6 mL per dose of the 125-mg/5-mL solution.4

To avoid potential confusion regarding a patient’s dose of an oral liquid, it is best to document the dose in mg amount instead of volume, and to only dispense a marked oral syringe if the product is being dispensed with it. There is also an effort nationally by the American Society of Health System Pharmacists to standardize available concentrations of oral liquids to help prevent such dosing errors.

Promote safe medication administration in school
The need for medication administration during the school day has increased significantly over the last decade for children with chronic conditions such as epilepsy, diabetes, attention-deficit/hyperactivity disorder (ADHD), food allergies, and asthma. Ideally medication administration while children are in school should be avoided if possible. This can be accomplished through use of long-acting formulations, for example.

When medication administration in school is necessary, preferably a school nurse should coordinate this, but as school budgets are limited, school nurses are becoming obsolete and there is increased risk of errors associated with unlicensed personnel administering medications.5 To mitigate risk, educate caregivers to label medication(s) and include an appropriate measuring device (eg, oral syringe) when necessary and instructions on when and how to administer.

To ensure proper labeling, the outpatient pharmacy may be willing to generate an extra label to be applied to the school supply of medication. Any changes in medication or dose should be communicated directly to applicable school staff. If providing the school with medication devices such as an asthma inhaler, an EpiPen, or an insulin pen, instructions should be provided as well as a demonstration, if possible, to ensure safe and effective use.5

With these risks in consideration, taking the necessary steps to ensure safe vaccine use, updated medication lists, and promoting safe medication administration in schools will help keep children safe in this new school year and beyond.

For references, go to ContemporaryPediatrics.com/stop-medication-errors

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Children’s well-being decreases as media use increases

Compared with their peers who spend no more than 2 hours each weekday exposed to digital media, school-aged children who are in front of screens for longer are less likely to be doing well overall, according to their parents. Furthermore, how much digital media exposure (DME) a child gets is inversely related, in a dose-dependent manner, to markers of childhood “flourishing.”

These were findings of an analysis of data from the 2011-2012 National Survey of Children’s Health for 64,500 children aged from 6 to 17 years.

The survey assessed DME with 2 parental questions related to how much time on an average weekday the child spends, independently of schoolwork: 1) watching videos, TV, and DVDs, and playing video games; and 2) using computers, cell phones, and other electronic devices.

To assess their children’s well-being, parents addressed 5 markers of flourishing: 1) how often the child does required homework; 2) cares about doing well in school; 3) finishes tasks; 4) follows through on commitments; and 5) stays calm and in control when faced with a challenge.

Fewer than 30% of children had a combined daily DME of 2 hours or less; 35.7%, 2 to 4 hours; 17.3%, 4 to 6 hours; and 16.5%, had 6 or more hours.

Children with the lowest average daily DME were more likely to demonstrate all 5 flourishing markers (the child “usually/always” practices the behavior) than their counterparts with higher daily DME averages. As DME hours increased, the proportion of children who demonstrated each marker decreased incrementally.

Among children with fewer than 2 hours of DME, only 38% had access to media devices in their bedroom compared with 73% of those with 6 or more hours of DME. One-third of those with 6 or more hours of daily DME were not subject to parental limits on screen time (Ruest S, et al. J Pediatr. 2018;197:268.e2-274.e2).

We are in the midst of a huge experiment on the impact of screen time on the developing child and adolescent brain. Whereas the well-being of children in this study was measured by parent report and although it is hard to prove that screen time caused the failure to flourish rather than the failure to flourish caused the use of screen time, this and other recently published studies warrant our attention and concern. Do you know how much time your patients spend using their phones, tablets, game consoles, and computers? In a recent Pediatrics Perspectives, Danielle Clark and colleagues at Baylor College of Medicine, Houston, Texas, propose a modification of the HEADSSS assessment to include screening for excessive use of social media (Pediatrics. 2018;141[6]:e20173655). The first step toward effective intervention is to make your patients and their parents aware of the magnitude of this problem.
Is this child overweight? Parents don’t see what you see!

Most parents of young children who are overweight or obese think their child’s weight is “just right,” according to a study conducted in Sweden. However, as their child grows older, more parents recognize when their child is too heavy—especially if he or she has reached the level of obesity.

These were the findings of an analysis of anthropometric measurements and parental questionnaires administered at regular child health visits for a large group of children when they were aged from 1 to 60 months. The analysis, which focused on data collected at the 2-year-old and 5-year-old visits, showed that at the 2-year-old visit, 14.9% of 2133 participants were considered to be overweight or obese as were 11.8% of 1862 participants at age 5 years, but only 3.6% of the parents of the heavy 2-year-olds thought their children weighed too much. Significantly more parents correctly identified that their child was overweight when he or she reached the age of 5 years, however, with 12.9% of parents of such children (most of whom were obese) indicating that their child weighed too much.

Compared with parents of normal-weight children, parents of overweight 2-year-olds were significantly heavier themselves and had less education (Berggren S, et al. Acta Paediatr. 2018;107[6]:1060-1064).

I find it both endearing and concerning that these parents couldn’t see their child’s overweight or obesity, and it is not just the Swedes. In a 2010 US study, more than 70% of parents with overweight or obese children chose drawings of children with a healthy weight (Clin Pediatr [Phila]. 2010;49[8]:790-798). The point is that parents may not see what you see, so we need to explain to parents when their child is overweight or obese. We can’t assume that parents realize their child has a medical condition, even when it is clear to us.

Vitamin D supplementation during pregnancy benefits offspring

Infants born to mothers who receive vitamin D supplementation while pregnant are at reduced risk of being small for gestational age (SGA) and experience improved growth during infancy, with no increased risk of fetal or neonatal mortality and congenital malformation. These were major findings of a systematic review and meta-analysis of 24 randomized controlled trials involving 5405 participants.

The meta-analysis revealed other benefits of maternal vitamin D supplementation, including higher neonatal vitamin D status. (Bolus or regular dose supplements were equally effective in improving vitamin D levels.) Additional positive outcomes of vitamin D supplementation were higher calcium levels and Apgar scores; greater neonatal skinfold thickness; greater weight (at birth and again at 3, 6, 9, and 12 months); and greater height (at 3, 6, 9, and 12 months).

Early or late administration (before or after 20 weeks’ gestation) of vitamin D supplementation and dose size affected some outcomes. Vitamin D supplementation increased birth weight only when initiated late, and vitamin D supplementation at 2000 IU/d or less was associated with reducing the risk of fetal or neonatal mortality and of SGA, whereas larger doses were not (Bi GW, et al. JAMA Pediatr. 2018;172[7]:635-645).

More than 100 years after scientists first suggested that an unidentified fat-soluble substance prevented and treated rickets, we still have plenty to learn about vitamin D. Researchers are compiling a lengthening list of body functions this vitamin affects well beyond bone health and calcium metabolism. Meanwhile, evidence of widespread vitamin D deficiency grows as we retreat to the indoors, away from natural sunlight.
Macroglossia and omphalocele in neonate

ASHLEY VARKEY, BS, MS4; MORGAN S BOWLING, DO

A 33-year-old female, G3P1011, was transferred at 33 weeks/6 days gestation to an outside facility with a neonatal intensive care unit (NICU) for preterm delivery secondary to preeclampsia. On prenatal ultrasound, her fetus was diagnosed with an omphalocele and delivery was preferred at an institution with a NICU to manage the infant.

History
The infant was subsequently delivered at 34 weeks and 1 day via cesarean delivery. At birth, weight was 2.825 kg (92nd percentile); length and head circumference were 47.5 cm (3rd percentile) and 31.0 cm (less than 1st percentile), respectively. One- and 5-minute Apgar scores were 8 and 9. Initial physical exam revealed macroglossia, bilateral earlobe creases, and a 4-cm by 4-cm omphalocele with an intact membrane (Figure 1). Neurologically, the baby was alert, active, and had normal tone and appropriate reflexes for age.

Examination and testing
Given the mother’s premature onset of labor, a blood culture was obtained in order to ensure the infant was not septic. Per protocol, the patient was started on ampicillin and tobramycin prophylactically. The culture was negative and the antibiotics were discontinued after 2 days.

Upon admission to the NICU, the infant was stable on room air but was intubated preoperatively for primary closure of the omphalocele with appendectomy. Per surgical consultation, the decision was made to remove the appendix in order to prevent an atypical presentation of appendicitis later on. Surgery occurred on the first day of life (Figure 2).

The infant’s initial electrolytes were all within normal limits. The first Dextrostick revealed a serum glucose of 50 mg/dL, which improved once she was placed on intravenous fluids. Total parenteral nutrition was started on postoperative day 1. Her first oral feed was on the fourth day of life.

A 2-D echocardiogram was completed both in preparation for the operating room and given the high suspicion of a syndrome diagnosis. It showed no cardiomegaly or ventricular hypertrophy; normal biventricular systolic function; patent foramen ovale with left-to-right shunting at the atrial level; and no evidence of pulmonary hypertension. A head ultrasound also was performed and showed no pathology.

On day 2 of life, the patient had a bilateral sonogram of the kidneys showing mild left pelvicaliectasis, confirmed on repeat imaging 5 days later. Given the renal findings, Perlman syndrome was added to the differential;
however, Beckwith-Wiedemann syndrome (BWS) remained high on the list given the characteristic facial features.

Differential diagnosis
History, physical exam, lab work, and imaging revealed underlying pathologies pointing to different diagnoses (Table 1).

PERLMAN SYNDROME
Perlman syndrome presents with neonatal macrosomia and polyhydramnios. It is caused by mutations in the DIS3L2 gene, which plays a role in mitosis and cell proliferation. Loss of the regulatory mechanism of this gene results in increased cell proliferation. Characteristic facial features include a broad and flat nasal bridge; a V-shaped upper lip; deep-set eyes and low-set ears; and a prominent forehead. Associated congenital anomalies are renal dysplasia; abdominal dystocia caused by visceromegaly involving the heart, liver, spleen, pancreas, and kidneys; severe hypotonia; and cryptorchidism in males.

SOTOS SYNDROME
Sotos syndrome involves increased birth weight and length as well as an advanced bone age. It is caused by an intragenic loss of function mutation, particularly the gene encoding NSD1. It can be distinguished from other overgrowth syndromes in that it has distinctive facial features including macrodolichocephaly; frontal bossing; down-slanting palpebral fissures; a long and narrow inferior mandible; hypertelorism; and a prominent philtrum. Brain formation abnormalities include an absent corpus callosum, prominent cortical sulci, trigone, occipital horns, and a dilatation of cerebral ventricles. Because of these abnormalities, approximately 50% of afflicted patients have seizures.

SIMPSON-GOLABI-BEHMEL SYNDROME
Simpson-Golabi-Behmel syndrome, an X-linked disorder with mutations in the GPC3 gene associated with an exonic deletion, presents with both prenatal and postnatal overgrowth with characteristic facies and orthopedic abnormalities. Common facial features include hypertelorism; down-slanting palpebral fissures; epicanthic folds; macrostomia; macroglossia; a short nose with a broad nasal bridge; and, in some cases, a cleft lip and palate. Orthopedic characteristics include short and broad hands and feet with metatarsus varus; talipes equinovarus; cutaneous syndactyly; and postaxial polydactyly. Other features include organomegaly and skeletal findings.

Discussion
Beckwith-Wiedemann syndrome (BWS) was first described in 1969 and is the most common genetic overgrowth syndrome. It is characterized by macrosomia, macroglossia, hemihypertrophy, omphalocoele, organomegaly, and facial nevus flammeus. Prevalence is 1 per 13,700 to 15,000 births, with equal prevalence among males and females.

Babies that initially present with BWS are larger in size, and as they grow they continue to exhibit either symmetric or asymmetric overgrowth. Additional features of BWS include proptosis with periorbital fullness; earlobe creases and pits; and organomegaly. Children with BWS are at an increased risk for embryonal tumors including Wilms tumor, hepatoblastoma, neuroblastoma, and rhabdomyosarcoma. The risk for these tumors is up to 7.5% until age 8 years. Children affected also can have hypoglycemia and hypocalcemia. The hypoglycemia can persist throughout childhood and is often refractory to treatment.

Beckwith-Wiedemann syndrome is caused by genetic abnormalities involving chromosome 11p15. Loss of methylation on the maternal chromosome, in particular in the imprinting control region (ICR) 2, is the most common cause of BWS and this leads to reduced expression of CDKN1C, a gene that normally negatively regulates cell
puzzler

Diagnosis of BWS is made clinically if the patient has 3 major criteria or 2 major and 1 minor criteria (Table 2).4 In a patient with suspected BWS, if loss of methylation or abnormal methylation of ICR2 is found on genetic testing, the diagnosis can be confirmed.2

In a newborn with BWS, one would note macroGLOSSIA, macrosomia, and abdominal wall defects. However, it is recognized that not all patients with BWS have these particular features.5 Hemihyperplasia, particularly unilateral renal hyperplasia, is also present in some infants. Furthermore, alpha fetoprotein (AFP) may be initially elevated, but more so than the first value, it is the trend in AFP that is important. For example, in the case of a hepatoblastoma, there is a progressively increasing AFP.

Management and treatment
Acute management of a patient with BWS is multifactorial and often targeted at the specific clinical manifestations. An omphalocele requires surgical repair, which can be either a primary or a staged procedure. Prior to having an operation, a cardiac evaluation is necessary as cardiomegaly is a possible sequelae of the overgrowth syndrome. Additionally, if the infant presents with macroGLOSSIA, it is then imperative to assess the airway thoroughly prior to undergoing anesthesia. A significantly large tongue can compromise the airway so much so that a tracheostomy may have to be considered. MacroGLOSSIA also may impede feeding. Severe cases call for tongue reduction surgery.

Endocrine abnormalities are also common, including hypothyroidism, hyperlipidemia, and/or hypercholesterolemia. Hypoglycemia, thought to be caused by hyperinsulinism, is often one of the first problems to manifest in the neonate. Prompt treatment must ensue to prevent central nervous system (CNS) problems including seizures and poor neurologic development. Most cases of hypoglycemia resolve within the first few days of life.

Patients with BWS need certain screening both during infancy and into adulthood. A child with BWS requires tumor surveillance until aged 8 years, and an annual renal ultrasound through adolescence. Hypercalciuria also should be monitored with a urine calcium/creatinine ratio. In terms of facial hemihyperplasia, surgical correction is possible. As an adult with BWS, concerns include renal medullary dysplasia as well as decreased fertility in males. An echocardiography should be done every 3 to 5 years to evaluate for possible cardiomyopathy and, similarly to children, adults also need a renal ultrasound annually, renal function tests every 3 to 5 years, and a hearing evaluation every 2 to 3 years.2

Without the development of malignant tumors, the prognosis for children affected with BWS is generally good. Growth rate slows around age 7 or 8 years.4 In fact, if there were to be adverse developmental outcomes, these can be attributed to complications of prematurity or extreme hypoglycemia, not the actual syndrome.1

Patient outcome
Given this patient’s specific physical exam findings, genetic testing for BWS was ordered. Results revealed hypomethylation on ICR2, consistent with a diagnosis of BWS.

She was discharged home on breast...

| Table 1: Differential Diagnosis for Infant with Omphalocele |

<table>
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<th>Differential Diagnosis for Infant with Omphalocele</th>
<th>Clinical Manifestations</th>
<th>Diagnostic Imaging</th>
<th>Genetic Testing</th>
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<td>Neonatal macrosomia, polyhydramnios</td>
<td>Ultrasound</td>
<td>Mutations in the DIS3L2 gene</td>
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<tr>
<td>Sotos syndrome</td>
<td>Overgrowth, frontal bossing, hypertelorism</td>
<td>MRI</td>
<td>Loss of function mutation in NSD1 gene</td>
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<tr>
<td>Weaver syndrome</td>
<td>Accelerated bone growth, macrocephaly, cerebral atrophy</td>
<td>MRI, skeletal survey</td>
<td>Mutations in EZH2 gene</td>
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<td>Simpson-Golabi-Behmel syndrome</td>
<td>Hypertelorism, organomegaly, polydactyly</td>
<td>Ultrasound</td>
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</tr>
<tr>
<td>Beckwith-Wiedemann syndrome</td>
<td>Macrosomia, omphalocele, macroGLOSSIA, organomegaly, embryonal tumors</td>
<td>Ultrasound</td>
<td>Genetic abnormalities of chromosome 11</td>
</tr>
<tr>
<td>Trisomies</td>
<td>rocker bottom feet, cleft palate, intellectual disability, simian crease</td>
<td>Karyotype, MRI</td>
<td>Mutation in number of chromosomes</td>
</tr>
</tbody>
</table>

Abbreviation: MRI, magnetic resonance imaging. Author created.
milk feeds ad lib, with follow-up appointments with the high risk clinic, cardiology, and general surgery.

### TABLE 2

**MAJOR AND MINOR FINDINGS OF PATIENTS WITH BWS**

<table>
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<tr>
<th>Major Findings</th>
<th>Minor Findings</th>
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<td>Positive family history</td>
<td>Neonatal hypoglycemias</td>
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<tr>
<td>Macrosomia</td>
<td>Facial nevus flammeus</td>
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<tr>
<td>Anterior linear earlobe creases/posterior helical ear pits</td>
<td>Diastasis recti</td>
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<tr>
<td>Macroglossia</td>
<td>Advanced bone age</td>
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<tr>
<td>Omphalocele</td>
<td>Structural cardiac anomalies</td>
</tr>
<tr>
<td>Visceromegaly (one or more intra-abdominal organs)</td>
<td>Facies: midface hypoplasia, infraorbital creases</td>
</tr>
<tr>
<td></td>
<td>Pregnancy-related findings: prematurity, polyhydramnios</td>
</tr>
</tbody>
</table>

Embryonal tumor in childhood  
Hemihyperplasia  
Cytomegaly of the fetal adrenal cortex  
Renal abnormalities  
Cardiomegaly  
Placental mesenchymal dysplasia  
Cleft palate  
Cardiomyopathy

Abbreviation: BWS, Beckwith-Wiedemann syndrome.

From Pappas JG.2

For references, go to ContempPediatrics.com/puzzler-0818

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Sports-related concussion
When it's OK to return to play

Pediatricians need to understand both pathophysiology and management of concussion to correctly address the question of return-to-play for athletes after a jolt to the head.

PAT F BASS III, MD, MS, MPH; AMY E VALASEK, MD, MS

Concussions are a common problem for the pediatrician with 1.6 to 3.8 million occurring per year in the United States. Although falls, motor vehicle accidents, and assaults are the most common etiology, 1 in 5 is a sports-related concussion (SRC). The percentage of SRC is even higher in adolescents. The pediatrician needs to be able to discuss this topic with parents and caregivers, identify common symptoms, and know when a child can return to play when an SRC is suspected.

Concussion is synonymous with mild traumatic brain injury (MTBI) and can be defined as: “a complex pathophysiologic process affecting the brain, induced by traumatic biomechanical forces secondary to direct or indirect forces to the head. MTBI is caused by a blow or jolt to the head that disrupts the function of the brain. This disturbance of brain function is typically associated with normal structural neuroimaging findings (ie, computed tomography [CT] scan, magnetic resonance imaging [MRI]).”

A number of different features may be used in further defining the nature of an SRC:

- May be caused by a direct blow to the head or elsewhere (eg, neck or face) with forces transmitted to the head.
- Has typically rapid onset of and short duration of neurologic impairment with spontaneous resolution of symptoms. However, in some cases, signs and symptoms may evolve over a longer period (minutes to hours).
- May result in neuropathologic changes, but the acute injury reflects a functional disturbance as opposed to a structural injury.
- Range of clinical signs and symptoms may not involve a loss of consciousness. Resolution of symptoms typically follows a sequential course, but prolonged symptoms occur in some.
- Only 10% of concussions involve a loss of consciousness.

Pathophysiology and symptoms
The disturbance in brain function from a concussion is more related to brain metabolism than to a structural injury or damage. Neurological dysfunction involves a number of different processes and a complex cascade of metabolic and physiologic events that may result in a constellation of symptoms (Table 1).

Diagnosis and assessment
Scenario 1: A 15-year-old lacrosse player comes off the field after a helmet-to-helmet contact complaining of headache, ringing in
his ears, dizziness, and nausea. What should be done next?

Although an SRC can be difficult to diagnose in real time, the adolescent clearly had a helmet-to-helmet contact and now has symptoms. Further, the majority of SRCs do not involve a loss of consciousness. In any suspected case of concussion, the athlete should be removed from the activity and assessed by a physician or other licensed healthcare provider.

Diagnosing suspected SRC involves the assessment of clinical symptoms, physical signs, cognitive impairment, neurobehavioral symptoms, and sleep/wake disturbances (Table 1). An SRC diagnosis should be suspected when there are abnormalities in 1 or more of these domains.

**Sideline assessment**

Sideline assessments consisting of neuropsychologic test batteries and memory function are both effective and practical. The Sport Concussion Assessment Tool–5th Edition (SCAT5) is one such test and is the most well-established and rigorously tested assessment for SRC. The SCAT5 should be administered by an appropriately trained health professional, whereas coaches and other nonlicensed personnel should use the Concussion Recognition Tool 5th Edition (CRT5). There is no evidenced-based recommendation for any particular tool or protocol and best practice dictates a tool such as the SCAT with possible addition of video review if available.

However, the SCAT5 should not continue to be used as an assessment tool when more than 3 to 5 days have lapsed since the injury. The SCAT5 can be used in children aged older than 12 years and adults. There is also a version for children aged younger than 12 years.

The SCAT5 employs an on-field rapid assessment for suspected SRC. It is important for the pediatrician to understand that the tool does not provide definitive diagnosis of a head injury. The immediate sideline assessment consists of 5 steps (Table 2).

**STEP 1: RED FLAGS**

In Step 1, the pediatrician or health professional is looking for red flag signs that should lead to immediate removal and evaluation. The symptoms include:

- Neck pain (consider cervical-spine injury)
- Double vision
- Numbness or weakness in an extremity (consider cervical-spine or spinal-cord injury)
- Severe or worsening headache (consider intracranial bleed)
- Seizure
- Loss of consciousness or deteriorating level of consciousness (consider intracranial bleed)
- Vomiting (consider increased intracranial pressure)
- Restless, agitated, or combative (consider increased intracranial pressure or bleeding)

**STEP 2: OBSERVABLE SIGNS**

In Step 2, the pediatrician is looking for observable signs of an SRC, such as:
Clinical feature

- Lying motionless on the playing surface
- Balance and gait abnormalities
- Disorientation or confusion
- Blank or vacant look
- Facial injury after head trauma

**STEP 3: MEMORY ASSESSMENT/MADDOCKS QUESTIONS**

The SCAT5 uses 5 brief questions to assess the athlete’s memory. It is important for the pediatrician to know that standard orientation questions such as time, place, and person are unreliable in athletic competition.

**STEP 4: GLASGOW COMA SCALE (GCS)**

The GCS is a well-known, researched, and practical assessment tool for impairment of conscious level in response to predetermined stimuli.

**STEP 5: CERVICAL SPINE ASSESSMENT**

In the final step the pediatrician asks the athlete if he or she is pain free at rest. If there is no pain at rest, the pediatrician then asks if the athlete remains pain free with full active range of motion and determines if limb and sensation are normal.

**OFFICE/OFF-FIELD ASSESSMENT**

If the sideline assessment determines that SRC is no longer suspected, the physician or health professional can determine when it is appropriate for the athlete to return to play. If it is determined that additional testing is needed, it should be done in a distraction-free environment such as a medical or locker room. The office/off-field assessment should be performed when the patient is in a resting state at approximately the patient’s resting heart rate. It includes 5 steps (Table 2):

**TABLE 2**

<table>
<thead>
<tr>
<th>CONCUSSION ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIDELINE ASSESSMENT</strong></td>
</tr>
<tr>
<td>STEP 1: Red flags</td>
</tr>
<tr>
<td>STEP 2: Observable signs</td>
</tr>
<tr>
<td>STEP 3: Memory assessment/Maddocks questions</td>
</tr>
<tr>
<td>STEP 4: Glasgow Coma Scale</td>
</tr>
<tr>
<td>STEP 5: Cervical spine assessment</td>
</tr>
<tr>
<td><strong>OFFICE/OFF-FIELD ASSESSMENT</strong></td>
</tr>
<tr>
<td>STEP 1: Background</td>
</tr>
<tr>
<td>STEP 2: Symptoms</td>
</tr>
<tr>
<td>STEP 3: Cognitive screening</td>
</tr>
<tr>
<td>STEP 4: Neurologic screen</td>
</tr>
<tr>
<td>STEP 5: Delayed recall</td>
</tr>
</tbody>
</table>

**STEP 1: BACKGROUND**

In Step 1, the pediatrician takes a history focusing on prior concussions or head injuries, prior treatment for concussions, and previous recovery time. It is also important to establish whether the patient has a prior history of headaches, learning disabilities, depression, anxiety, or mental health comorbidities, as well as any current medication.

**STEP 2: SYMPTOMS**

The athlete is given a symptom form, reads it aloud, and completes a severity scale for the 22 listed symptoms such as headache, sensitivity to noise or light, and difficulty remembering.

**STEP 3: COGNITIVE SCREENING**

The athlete completes tasks related to orientation and immediate memory. The tool also assesses concentration by having the athlete repeat a series of numbers read backward to him or her and naming the months of the year in reverse order.

**STEP 4: NEUROLOGIC SCREEN**

The patient’s reading of the symptoms (step 2), cervical pain, double vision, finger-to-nose test, and tandem gait are all assessed as part of the SCAT5. A complete neurologic exam is also recommended, including cranial nerves, sensation, reflexes, cerebellar testing, finger-to-nose, rapid alternating hands, heel-to-shin, and Romberg test. The athlete is also asked to perform a number of balance tests such as standing on 1 leg and tandem gait. Balance is often off in the acute setting.

**STEP 5: DELAYED RECALL**

The patient is asked to repeat as many words from the immediate recall task at least 5 minutes later.

**Return-to-play**

**Scenario 2:** After 20 minutes, the athlete says he feels fine and wants to return to the game. The exam is now normal and concentration and delayed recall have improved. Can he return to play?

Creighton and colleagues developed a 3-step decision-based model that can assist the pediatrician in a return-to-play decision. It focuses on:

- Health status of the athlete. In this step, the pediatrician looks...
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Clinical Feature

Continued from Page 20

at medical factors related to how much healing has occurred, what current symptoms are, and potential seriousness of injury.

- **Participation risk.** In this step, the pediatrician looks at not only the current health status of the athlete, but also what risks are inherent to a particular sport, position of the particular athlete in question, and ability to protect. Different individuals may have different levels of acceptable risk.

- **Decision modifiers.** Finally, there are other things that may influence a decision such as pressure from the athlete or family, timing of the season, external pressures, or fear of litigation.

This athlete should not return to play despite not having symptoms. No patient should return to play on the same day as an SRC. All 50 states have Return-to-Play laws so the pediatrician should be familiar with the laws in his or her own state.

The 5th International Conference on Concussion’s 2016 Consensus Statement on Concussion in Sport states: “A player with diagnosed SRC should not be allowed to return to play on the day of injury.”

“...A player with diagnosed [sports-related concussion] should not be allowed to return to play on the day of injury.”

—5th International Conference on Concussion

The significant concern for immediate return is second-impact syndrome—rapid cerebral vascular congestion due to flow dysregulation following a concussion that can lead to cerebral swelling and death. Typically second-impact syndrome occurs in the first 1 to 2 weeks after an initial concussion and this fact should be taken into account when giving guidelines for a return-to-play protocol. Often the protocol is spread out in children (no data on this) but it is suggested to allow phases to take 7 to 14 days depending on the child to fully return to contact.

Analysis from a US national registry over 30 years revealed approximately 9 deaths per year, most commonly in football, after a recent history of concussion. In a 2016 report in *Pediatric Neurology* that identified 17 patients in the published literature with second-impact syndrome in American football, male gender and young age appeared to be associated risk factors.

**Return-to-learn**

Scenario 3: The lacrosse player is removed from the game and remains symptomatic. His parents are given education about red flags and he is told to follow up with his pediatrician. Two days after his lacrosse match, he is reporting daily headaches, dizziness, fatigue, and noise sensitivity. He is a good student and has several tests this week. What is the next step?

The pediatrician in the office should perform or repeat the SCAT5 to see any worsening or improvement in symptoms. Of note, many institutions and schools now require a preseason assessment so that objective changes are readily apparent when a pediatrician or health professional has no prior experience with an athlete.

Patients experiencing a concussion should avoid reinjury and avoid overexertion—both physical and mental. This may require some school accommodations. The athlete should not return to play until he or she has first successfully returned to school.

Although lacking research demonstrating harm, cognitive rest (avoiding cognitive stressors such as video games, school work, texting, and TV) has been recommended by several clinical guideline statements.

**Resources for Pediatricians**

**American Academy of Pediatrics**

School recommendations following concussion


**Centers for Disease Control and Prevention**

Heads Up

[www.cdc.gov/headsup/index.html](http://www.cdc.gov/headsup/index.html)

**Concussion in Sport Group**

Sport Concussion Assessment Tool–5th Edition (SCAT5)

[http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf](http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf)

Child SCAT5

[http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf](http://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097492childscat5.full.pdf)

Concussion Recognition Tool 5th Edition (CRT 5)

[http://bjsm.bmj.com/content/early/2017/04/28/bjsports-2017-097508CRT5](http://bjsm.bmj.com/content/early/2017/04/28/bjsports-2017-097508CRT5)
A number of studies have, in fact, demonstrated that intense cognitive activity may actually worsen concussive symptoms.\(^2\,12\) Intense cognitive and intellectually demanding activities possibly stress an already metabolically altered brain and result in worsening symptoms.

Whereas returning to a normal routine is good for an adolescent, one of the main goals in management of the post-concussive patient is to limit cognitive activity to the point where it begins to reproduce or worsen symptoms.

One recommendation is that athletes should remain out of school as long as symptoms prevent concentration for up to 30 minutes. After the student athlete is able to tolerate 30 minutes of cognitive activity without a worsening of symptoms, the student may begin home tutoring or in-school instruction.\(^12\) The 2016 guideline recommends 24 to 48 hours of rest followed by gradual and more progressive increases in cognitive activity, being careful to not exacerbate symptoms.\(^2\)

Most students will return to school while experiencing symptoms from their concussion. Certain “academic adjustments” may need to be made to the adolescent’s regular schedule and may need to be negotiated among school, parent, and the pediatrician.

**These adjustments (see Resources for Physicians, page 22, for a form the pediatrician can use to communicate with schools) need to be individualized to student and school but could include:**\(^12\)
- Shortened days
- 30 minutes of instruction with a 15-minute break
- Providing class notes
- Tutoring
- Decreasing course expectations
- Decreasing exposure to classes that exacerbate symptoms

### TABLE 3
**RETURN-TO-PLAY PHASES**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Baseline</th>
<th>Increase heart rate</th>
<th>Moderate exercise</th>
<th>Noncontact exercise/training drills</th>
<th>Practice</th>
<th>Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Patient needs to be on physical and cognitive rest with no symptoms for at least 24 hours.</td>
<td>Goal: Gradual reintroduction of work/school activities.</td>
<td>Goal: Increase heart rate.</td>
<td>Here the goal is to increase intensity but avoid contact. Activities could include more intense sprints, heavy conditioning, weight training, or noncontact, sport-specific drills.</td>
<td>Goal: Exercise, coordination, and increased thinking.</td>
<td>Goal: Return to competition.</td>
</tr>
<tr>
<td>1</td>
<td>Increase heart rate: The goal is to increase heart rate for 5 to 10 minutes through mild activity such as walking, light jogging, or an exercise bike.</td>
<td>Goal: Increase heart rate.</td>
<td>In this phase, the goal is limited body and head movement through more moderate intensity activities such as brief running or skating. Heavy noncontact, sports-specific movement. No heading the ball. All noncontact movements. No weightlifting at this step.</td>
<td>Goal: Increase heart rate.</td>
<td>Goal: Gradual reintroduction of work/school activities.</td>
<td></td>
</tr>
</tbody>
</table>

From McCrory P, et al\(^1\); May KH, et al.\(^1\)

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**The 2016 concussion guidelines recommend a 4-stage approach for return-to-learn:**\(^2\)
- **Stage 1.** Typical daily activities at home that do not increase symptoms. Start with 5 to 10 minutes and gradually build up.
- **Stage 2.** School activities such as homework, reading assignments, and other cognitive activities outside of regular school.
- **Stage 3.** Return to school part time, partial days, or with extended breaks during the day.
- **Stage 4.** Return to school full time with normal educational activities until a full day can be achieved without symptoms.

Most students will recover within 4 weeks and the academic adjustments can be discontinued.\(^2\) “Academic accommodation” or “academic modification” may be required if longer-term assistance is needed. These official plans, often referred to as a 504 plan, may require input from the pediatrician and include accommodations such as extra time for work and tests. In academic modification, changes usually are longer and may involve altering grade-level educational plans through an individualized educational program (IEP). These IEPs are comprehensive plans developed among parents, teachers, and school staff to address unique educational needs of students and address any accommodations.

**Guidelines for return-to-play**

The American Academy of Pediatrics and the 2016 concussion guideline recommend a 6-step process allowing for gradual return-to-play (Table 3).\(^2,15\) The continued on PAGE 34
If there is one essential component that influences the trajectory of a life, it is the presence of an engaged and loving adult during early childhood. “A parent or caregiver who is nurturing and invested in their young child is crucial to that child’s cognitive and social-emotional development, and this impact lasts a lifetime,” says Pamela C. High, MD, professor of Pediatrics, Warren Alpert Medical School, Brown University, and director of the Division of Developmental-Behavioral Pediatrics, Rhode Island Hospital, Providence.

In her talk at the 2017 American Academy of Pediatrics (AAP) National Conference and Exhibition titled “School readiness: Beyond the basics,” High emphasized the importance of the early years in an infant’s life as setting the stage for building the capacity and ability to learn.1 “The science behind early childhood development and the science of education is all the same science,” she says.

Although genetics provide the blueprint for brain development, epigenetics—or the influence of the environment on reading the genetic code—is equally if not potentially more important to brain development, according to High. “The environment impacts the way the genetic code is read, and it changes the brain structure,” she says. “It changes the physiology of the brain and this impact is present from the earliest moments of development.”

The American Academy of Pediatrics developed the mnemonic EBCD to capture the important elements of early brain and child development:

- Explore the child’s environment.
- Build relationships and reciprocity.
- Cultivate the child’s development.
- Develop parenting confidence.

The most active period of brain development is the first 1000 days of life (see “Early brain and child development: The first 1000 days” below).2 As important as this time is,
clinical feature

High stressed in her talk that early childhood should be thought of as a “sensitive” period rather than a “critical” one. It is a time of opportunity, when environmental factors most easily influence early brain and child development. However, if positive opportunities are lacking during this “sensitive time,” the developing brain retains some plasticity and is capable of recovery if the environment becomes more supportive. In this way, early experiences shape a child’s life course trajectory.

The rate of achievement of developmental stages during the life course signal if a child is developing as expected or if that development is delayed or restricted.

Along with educating new parents about the important developmental needs of infants and children, pediatricians also play a pivotal role in helping to identify those children for whom early intervention is needed to address any developmental delays.

In her talk, High discussed all these issues as they relate to a child’s readiness for school. As indicated by the title of the talk, she dipped deeper into issues beyond the basics of school readiness to provide pediatricians with a foundational understanding of the influence of early brain development on the life course of a child. After describing the importance of genetics and epigenetics on school readiness and life course trajectories, she summarized the life course perspective underlying school readiness and its implications for maternal and child health. A major focus of her talk was on providing pediatricians with evidence-based strategies to improve a child’s school readiness and life course, describing these strategies as opportunities for pediatricians to engage as advocates for the children in their care.

**Life course perspective**

A life course perspective for school readiness highlights that there is a typical pattern of development for children that involves acquisition of more knowledge, skills, abilities, and mature behaviors as a child ages. A positive relationship between infant and caregiver is essential for the initiation of healthy development.

The bond formed between mother

| TABLE 1 |
| BENEFITS OF HIGH-QUALITY PRE-K PROGRAMS |

<table>
<thead>
<tr>
<th>EARLY OUTCOMES</th>
</tr>
</thead>
</table>

**Educational**
- Lower rate of special education and grade retention
- Increased high school completion
- Higher test scores

**Social-emotional**
- Fewer behavioral problems
- More self-control
- Improved peer relations

**Child well-being**
- Less child maltreatment and neglect

<table>
<thead>
<tr>
<th>LATER OUTCOMES</th>
</tr>
</thead>
</table>

**Social**
- Increased productivity
- Increased earnings and tax revenues
- Decreased reliance on social services
- Decreased criminal activity
- Stops cycle of poverty

**Health**
- Improved health and mental health outcomes
- Less reliance on health services

Abbreviation: pre-K, prekindergarten.
From High P.1

| TABLE 2 |
| EVIDENCE-BASED MATERNAL INFANT EARLY CHILDHOOD HOME VISITING (MIECHV) INTERVENTION SERVICES |

<table>
<thead>
<tr>
<th>These services are supported by the US Health Resources and Services Administration (HRSA). Some of these are available in every US state and territory.</th>
</tr>
</thead>
</table>

- Attachment and Biobehavioral Catch-up (ABC)
- Child First
- Durham Connects/Family Connects
- Early Head Start—Home-Based Option
- Early Intervention Program for Adolescent Mothers
- Early Start (New Zealand)
- Family Check-Up
- Family Spirit
- Health Access Nurturing Development Services (HANDS)

- Healthy Beginnings
- Healthy Families America
- Home Instruction for Parents of Youngsters (HIPPY)
- Maternal Early Childhood Sustained Home-Visiting Program
- Minding the Baby
- Nurse-Family Partnership
- Parents as Teachers
- Play and Learning Strategies—Infant
- SafeCare Augmented

From US Health Resources and Services Administration.3
and child lays the groundwork for all future development, and is not “just touchy-feely stuff,” says High. Building on that essential relationship, a child develops increased language skills and greater capacity for emotional regulation and socialization skills because of the trust and security he or she has experienced. Appropriate development at each stage decreases the likelihood of behavioral problems.

Development is lifelong, and each stage of development provides support for the next, says High. Many factors can hinder a child from moving along this trajectory toward increasing developmental skills, cognition, and emotional regulation. Among these are early experiences that change the brain’s architecture, such as early and prolonged, unmitigated, or toxic stress. These can lead to lifelong problems including poorer health-related quality of life, more depression, and more chronic illness and disability.

Educating mothers and other caregivers on the importance of each developmental stage on the life course trajectory is crucial to help a child reach appropriate development at each stage. For children whose development is delayed, early intervention is crucial.

“For many children, there is a significant opportunity to enhance their development with many interventions so they can achieve their optimal developmental trajectory,” says High. “That is what the life course model is about.”

Evidence-based strategies to improve school readiness

One of the key ways to enhance school readiness for children, particularly those at risk of developmental delays, is to start education early—meaning prekindergarten (pre-K). High cites data from 3 sentinel pre-K programs (HighScope-Perry Preschool Study [Ypsilanti, Michigan]; Abecedarian Project [Chapel Hill, North Carolina]; and Child-Parent Centers [Chicago, Illinois]), all with well-matched control or comparison groups and follow-up for up to 40 years, showing impressive short- and long-term benefits (Table 1). From these data, economists calculate a 15% return on investment for high-quality preschool for at-risk children.

High emphasizes that pediatricians need to understand the importance of early education and to convey this to parents, particularly to those with children at risk of developmental delays.

In addition, she underscores the importance of formal, validated developmental and autism screening, recommended by the AAP since

### TABLE 3

**EVIDENCE-BASED PARENTING PROGRAMS**

- Incredible Years: [http://www.incredibleyears.com/about/](http://www.incredibleyears.com/about/)
- Triple P: [https://www.triplep.net/glo-en/home/](https://www.triplep.net/glo-en/home/)
How do I approach working locum tenens?
How can I find the best assignment for me?
Who will pay for my malpractice?
Who can guide me through the process?
Who provides the best support?

The answer: Weatherby Healthcare.
clinical feature

TABLE 4
WAYS FOR PARENTS AND CAREGIVERS TO ENGAGE WITH THEIR GROWING CHILDREN

<table>
<thead>
<tr>
<th>YOUNG INFANTS</th>
<th>OLDER INFANTS</th>
<th>TODDLERS</th>
<th>CHILDREN OF ALL AGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talk (sing) to your baby while you hold, feed, or play with him/her.</td>
<td>Copy your baby’s sounds and expressions.</td>
<td>Encourage and support your toddler, and set appropriate limits.</td>
<td>Give a lot of warm physical contact and attention; promotes a sense of security and well-being.</td>
</tr>
<tr>
<td>Let the baby look at your face.</td>
<td>Play peek-a-boo and patty-cake.</td>
<td>Be consistent: establish routines for meals, naps, and bedtime.</td>
<td>Be aware of their moods.</td>
</tr>
<tr>
<td>Respond to the baby’s gestures, faces, and sounds.</td>
<td>Teach the baby to wave “bye bye” and to shake his/her head “no” and “yes.”</td>
<td>Encourage drawing, building, and creative play.</td>
<td>Read and tell stories daily (bedtime routines).</td>
</tr>
<tr>
<td>Give the baby colorful objects to look at, including books and pictures.</td>
<td>Read books together—point to characters, let the baby pat and taste the book.</td>
<td>Introduce simple musical instruments.</td>
<td>Speak second languages.</td>
</tr>
</tbody>
</table>

*American Academy of Pediatrics recommendation.
From High P.1

For example, she said that the Nurse-Family Partnership program, designed for first-time mothers who are enrolled by the 28th week of their pregnancy and continue in the program until their child is aged 2 years, has shown strong effectiveness in reducing child abuse and neglect by 48%, reducing visits to the emergency department for accidents and poisonings by 56%, and reducing behavioral and intellectual problems by 67%.4

Other evidence-based parenting programs designed to promote social and emotional competence and prevent behavioral problems include Incredible Years, Family Check-Up, Triple P, and Parent Child Interactive Therapy (PCIT). These training programs begin by promoting healthy parent-child relationships, often including teaching parents how to participate in child-directed play and “times in.” As described by the Incredible Years Parenting Pyramid (Figure), the next steps involve coaching the child around social-emotional expression and persistence at task to improve their language and social-emotional regulation. Parents also are taught how to use praise effectively and how to provide spontaneous rewards and incentives. Children learn trust and security through maintenance of consistent routines and appropriate limit setting.

To address behavioral problems, parents are taught how to use ignoring and redirection first, and then limited time-out for the child to calm and regain composure. Most of these skills are taught with groups of parents who view videos and practice these techniques at home before reporting back to their peers. Table 3 lists websites providing more information on these programs.

Along with educating parents on the importance of pre-K schooling and

2003, to identify children with developmental challenges who qualify for early intervention.

Early intervention is for children aged 3 years and younger who show significant delays in cognition, hearing/visual abilities, communication skills, adaptive skills, and social-emotional skills. According to High, 2.95% of children in the United States in 2015 were enrolled in services that provided early intervention either in the home or in the community.

Table 2 lists a number of evidence-based early childhood intervention services offered in the home. Relatively new, home-based programs, often referred to as Maternal Infant Early Childhood Home Visiting programs, exist in every state, says High, although not in every town, and all can benefit child development.3
Table 4 provides a list of behaviors parents should be encouraged to engage in with their children. High underscores the need to enjoy talking, singing, and reading with young children every day and to limit access to digital media. As indicated at the end of the table, this is because of the adverse effects of too much screen time on the developing brain, including its association with obesity, sleep problems, attention-deficit/ hyperactivity disorder (ADHD), and aggression.1 Too much screen time also takes away from talking and building relationships, High says.

Another evidence-based model that High encourages pediatricians to employ is the Reach Out and Read model that promotes early literacy by enhancing early language skills and nurturing early relationships.5,6 “It is an ‘essential component’ of pediatric primary care according to the AAP,” she says. (For more information, see the AAP website Books Build Connections Toolkit at www.aap.org/en-us/literacy/Pages/default.aspx.)

In addition, High encourages pediatricians to educate parents on the availability of free educational tools available via websites, smartphones, and apps (Table 5).

Finally, High refers pediatricians to a simple guide for parents about habits they can cultivate to help nurture their child’s brain (see “5 R’s of nurturing brain development,” above).7

### Table 5: Free Educational Tools for Parents of Young Children

**Apps**

<table>
<thead>
<tr>
<th><strong>APP</strong></th>
<th><strong>URL</strong></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text4Baby</td>
<td><a href="https://www.text4baby.org/">https://www.text4baby.org/</a></td>
<td>Free text messaging app. Sends weekly texts messages on promoting child development from early childhood to elementary age. In Spanish and English.</td>
</tr>
<tr>
<td>Ready4K</td>
<td><a href="https://ready4k.parentpowered.com/">https://ready4k.parentpowered.com/</a></td>
<td>Free text messaging app. Sends 3 text messages a week aimed at supporting healthy child development to parents of children aged from birth to 3rd grade.</td>
</tr>
<tr>
<td>VROOM.org</td>
<td><a href="https://www.vroom.org/">https://www.vroom.org/</a></td>
<td>App with activities to promote developmental skills in math, literacy, problem solving, self-control, and communication. Provides badges and encouragement when tasks are completed. Developed by a panel of child development experts.</td>
</tr>
</tbody>
</table>

**Websites**

<table>
<thead>
<tr>
<th><strong>Website</strong></th>
<th><strong>URL</strong></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero to Three</td>
<td><a href="https://www.zerotothree.org/">https://www.zerotothree.org/</a></td>
<td>Sends monthly e-mails keyed to a child's age to promote healthy development. Offers webinars, podcasts, and videos for parents.</td>
</tr>
<tr>
<td>CDC: Learn the signs and act early</td>
<td><a href="https://www.cdc.gov/ncbddd/actearly/index.html">https://www.cdc.gov/ncbddd/actearly/index.html</a></td>
<td>Promotes early childhood development with downloadable materials for the family and has videos highlighting healthy development as well as signs of delayed development.</td>
</tr>
</tbody>
</table>

Abbreviations: AAP, American Academy of Pediatrics; CDC, Centers for Disease Control and Prevention.
Nonpharmacologic treatments for ADHD lack evidence base

A new study finds no support for updated guidance regarding use of such interventions.

MARY BETH NIERENGARTEN, MA

The Centers for Disease Control and Prevention (CDC) currently estimates that 6 million children and teenagers in the United States are diagnosed with attention-deficit/hyperactivity disorder (ADHD), the majority of whom (62%) are treated with ADHD medications.

Although ADHD medications are considered the most effective treatment for older children and adolescents, the use of nonpharmacologic treatments alone or in combination with these medications has been a topic of much discussion and research. “There are many approaches other than medications to treat ADHD, such as neurofeedback, cognitive behavioral therapy, or even dietary supplements,” says Alex R. Kemper, MD, division chief, Ambulatory Pediatrics, Nationwide Children’s Hospital, Columbus, Ohio. “We were interested in finding out how these treatments work, either alone or in combination with medications, to improve ADHD symptoms.”

The “we” that Kemper refers to are his coinvestigators on a recently published meta-analysis in which they assessed the comparative effectiveness of nonpharmacologic treatments for ADHD.

After a systematic review of the current evidence on nonpharmacologic treatments for ADHD, however, the investigators found no clear scientific evidence on the benefit of any of these treatments. “Unfortunately, we did not find the kind of scientific evidence that could help inform patients, families, or clinicians,” says Kemper, who is the senior author of the study.

Despite this, Kemper emphasizes that the lack of scientific evidence does not mean these treatments are not effective. Rather, he underscores the need for more studies on how best to treat ADHD.

Current scientific evidence: considerations for practice

Published in June 2018, the study included data from 54 studies of young persons aged 17 years and younger diagnosed with ADHD and treated with nonpharmacologic treatments alone or combined with ADHD medications. In all the studies, a nonpharmacologic intervention was compared to other nonpharmacologic interventions, and pharmacologic treatment approved by the US Food and Drug Administration (FDA), or usual care (placebo). All studies had at least 50 patients enrolled in the study.

The types of nonpharmacologic interventions evaluated in these studies and assessed in the current meta-analysis included behavioral interventions (ie, neurofeedback, cognitive training, cognitive behavioral therapy, child or parent training) and dietary interventions (ie, dietary, herbal, or omega fatty acid supplements). Other interventions included acupuncture, homeopathy, and telemedicine.

When assessing the comparative effectiveness of these treatments (Table), Kemper and colleagues found no scientific evidence to support new guidance on the use of any of these nonpharmacologic interventions for ADHD.

For the complete review of this study, with commentary by Harlan R. Gephart, MD, of Contemporary Pediatrics’ Editorial Advisory Board, and references, go to ContemporaryPediatrics.com/ADHD-nonpharmacologic-treatment

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**TABLE**

Nonpharmacological Interventions for ADHD

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omega fatty acids</td>
<td>Supplements fared poorly against a common ADHD medication (methylphenidate) and showed no efficacy.</td>
</tr>
<tr>
<td>Neurofeedback and cognitive training</td>
<td>Data show mixed outcomes.</td>
</tr>
<tr>
<td>Ginkgo biloba</td>
<td>Showed promise in 2 studies.</td>
</tr>
<tr>
<td>Acupuncture, telemedicine, homeopathy</td>
<td>Showed limited evidence.</td>
</tr>
</tbody>
</table>

Abbreviation: ADHD, attention-deficit/hyperactivity disorder.

Goode AP, et al. 2

For the complete review of this study, with commentary by Harlan R. Gephart, MD, of Contemporary Pediatrics’ Editorial Advisory Board, and references, go to ContemporaryPediatrics.com/ADHD-nonpharmacologic-treatment
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Suicide attempts and ideation among teens are on the rise

The startling increase in the number of adolescents thinking about and attempting suicide is a wake-up call for pediatric healthcare providers to take action and help these children at risk.

MARY BETH NIERENGARTEN, MA

Hospital admissions for suicide attempts and suicide ideation in adolescents are on the rise. Recently published data show that the numbers of hospital encounters and admissions for suicide attempts and suicide ideation in young persons more than doubled during the period 2008 to 2015.1

Coming on the heels of recommendations recently issued by the American Academy of Pediatrics (AAP) for depression screening and treatment options for primary care providers (PCPs),2,3 the data bolsters the need for pediatricians and PCPs to recognize and screen for mental health issues in their patients to help stem and, hopefully, reverse this trend toward suicide.

“Depression and suicide are pediatric issues,” says Michael S. Jellinek, MD, professor emeritus of Psychiatry and of Pediatrics, Harvard Medical School, Boston, Massachusetts. “The prevalence is so high and the consequences so great, this is part of pediatrics and there will never be enough mental health professionals to transfer these needs to them.”

Jellinek, who did not participate in the study but provided comment on it, is unequivocal in what he sees as the role of pediatricians in addressing suicide and other mental health issues in their patients. “Screening, recognition, and initial management are pediatric responsibilities,” he emphasizes.

Suicide attempts and ideation

Suicide is the third-leading cause of death among US adolescents, and suicide ideation and attempts are strong indicators of children at risk of dying by their own hand. Despite this, sufficient mental health providers needed to identify and help these children remain limited and many of these children end up in emergency departments (EDs) and acute care hospitals for crisis care for suicide ideation or attempts.

Given that, one way of identifying changes over time in the burden of suicide ideation and attempts is to look at data from EDs and inpatient units at children’s hospitals in the United States.

That is what Plemmons and colleagues did in the new study. Using clinical and billing data from 49 US children’s hospitals contained in the Pediatric Health Information System Database, the investigators examined changes in the burden of suicide ideation and attempts between 2008 and 2015. They also looked at the demographic and clinical characteristics of these children.

Table 1 lists the key findings of the study.

Of the total number of children who presented to hospitals with suicide ideation or attempts, the study found that more than half were hospitalized. In addition, although there was a rise in both suicide ideation and attempts in all age groups and both sexes, adolescents aged between 15 and 17 years and those aged 12 to 14 years had the greatest increase. Rates were particularly high in adolescent girls.

When looking at when these events tended to incur, the study found a strong seasonal variation with peak occurrence in the fall and spring and the lowest occurrence in the summer.

This last finding came as a surprise to the study authors. According to the

“Depression and suicide are pediatric issues.

The prevalence is so high and the consequences so great, this is part of pediatrics and there will never be enough mental health professionals to transfer these needs to them.”

– MICHAEL S. JELLINEK, MD
lead author of the study, Gregory Plemmons, MD, associate professor of Pediatrics, Division of Hospital Medicine, Monroe Carell Jr. Children's Hospital at Vanderbilt, Nashville, Tennessee, this suggests that school may play an important role. “This is generally opposite from the findings seen in adults,” he says, “for which summer appears to be the highest time for suicide ideation and attempts.”

In the study, the investigators cite current attention given to how schools and social media influence adolescent behavior and the possible role of social contagion. However, they underscore that the relationship between school and suicide ideation is an area that needs further study.

**Clarion call to pediatricians**

Improving detection of depression and other issues that may make young persons more susceptible to thinking about and attempting suicide is highlighted by the data from the study.

For pediatricians, this means getting more involved in screening for and managing mental health issues in their patients. “Pediatricians have a unique opportunity to screen for depression and suicide, and to talk to children and their families about the importance of mental as well as physical health,” says Plemmons.

Jellinek underscores this by listing a number of things that pediatricians can be doing in the clinic to improve detection of children at risk for depression and suicide (Table 2).

Although emphasizing all these as important steps to identifying adolescents at risk of suicide, Jellinek says that increasing the use of screening instruments (PHQ-9 or Pediatric Symptom Checklist) is the most relevant. For more information on where to find downloadable forms, see “Resource tools for screening emotional and mental health,” page 34.

“These are embedded in electronic medical records and increasingly used as a quality requirement in response to the unrecognized and unmet mental health needs of adolescents in pediatric primary care,” Jellinek says.

Plemmons also emphasizes the need for pediatricians to advocate for mental health support in local communities. “It’s crucial to remove the

---

**TABLE 1**

INCIDENCE OF SUICIDE IDEATION AND SUICIDE ATTEMPT: 2008-2015

<table>
<thead>
<tr>
<th>Total incidence</th>
<th>N=115,856</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual percentage of all visits</strong></td>
<td>Increased from 0.66% in 2008 to 1.82% in 2015 (average annual increase of 0.16 percentage points; 95% CI, 0.15-0.17)</td>
</tr>
<tr>
<td><strong>Average annual increase by age</strong></td>
<td>Adolescents aged 15-17 y: 0.27 percentage points (95% CI, 0.23-0.30)</td>
</tr>
<tr>
<td></td>
<td>Adolescents aged 12-14 y: 0.25 percentage points (95% CI, 0.21-0.27)</td>
</tr>
<tr>
<td><strong>Average annual increase by sex</strong></td>
<td>Girls: 0.14 percentage points (95% CI, 0.13-0.15)</td>
</tr>
<tr>
<td></td>
<td>Boys: 0.10 percentage points (95% CI, 0.09-0.11)</td>
</tr>
<tr>
<td><strong>Average annual increase by season</strong></td>
<td>Highest rates in the fall and spring:</td>
</tr>
<tr>
<td></td>
<td>October: 9.9% (95% CI, 9.2-10.7)</td>
</tr>
<tr>
<td></td>
<td>March: 9.7% (95% CI, 9.2-10.1)</td>
</tr>
<tr>
<td></td>
<td>Lowest rates in the summer:</td>
</tr>
<tr>
<td></td>
<td>July: 5.9% (95% CI, 5.6-6.1)</td>
</tr>
</tbody>
</table>

*Significant increases in all age groups, but higher for adolescents aged 15-17 years and those aged 12-14 years. Incidence was higher in girls. Abbreviation: CI, confidence interval. From Plemmons G, et al.*

**TABLE 2**

IDENTIFYING YOUNG PERSONS AT RISK OF SUICIDE

- Use screening tools such as the PHQ-9 or Pediatric Symptom Checklist (depression subscale).
- Screen for substance abuse.
- Assess adolescent’s mood and level of stress during the clinical visit.
- Be aware of adolescent’s family history of substance abuse, suicide, or depression.
- Ask adolescent about suicidal ideation or attempt if the adolescent shows any positive findings on the above.

Abbreviation: PHQ-9, Patient Health Questionnaire-9. Created by Michael S. Jellinek, MD.
clinical brief

stigma surrounding seeking mental health care and promote wellness,” he says.

Plemmons urges pediatricians to be aware of the increasing influence of many factors, such as social media and cyberbullying, that may be contributing to the rise in suicide ideation and attempts.

All this is not easy, emphasizes Jellinek. “Dealing with adolescent depression and suicide is difficult work,” he says. “Pediatricians will benefit from training and the collaboration of a trusted mental health professional.”

“These patients cause much worry and I would recommend never worrying alone,” Jellinek advises.

Summary
The increase in the number of adolescents thinking about and attempting suicide is a wake-up call for pediatricians and other healthcare providers to take more action, both in the clinic and community, to identify and help children at risk. Pediatricians can implement some steps in the clinical visit to screen for children and adolescents at risk of depression, stress, and other factors that may make them susceptible to suicide. Working with a trusted mental health professional is encouraged to help both the child as well as the pediatrician.

Ms Nierengarten, a medical writer in Minneapolis, Minnesota, has over 25 years of medical writing experience, authoring articles for a number of online and print publications, including various *Lancet* supplements and Medscape. She has nothing to disclose in regard to affiliations with or financial interests in any organizations that may have an interest in any part of this article.

Resource tools for screening emotional and mental health

Download these valuable resources to help when assessing emotional and mental health in pediatric patients.

**American Academy of Pediatrics clinical report on suicide**

**Patient Health Questionnaire-9 (PHQ-9)**
https://www.phqscreeners.com/sites/g/files/g10016261/f/201412/PHQ-9_English.pdf

**Pediatric Symptom Checklist (PSC)**
https://brightfutures.aap.org/Bright%20Futures%20Documents/Pediatric%20Systems%20Checklist%20(PSC-35).pdf

For references, go to ContemporaryPediatrics.com/teen-suicide

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Return-to-play continued from page 23

protocol progresses every 24 hours so long as symptoms do not occur. If any symptoms of concussion occur, the patient is returned to the previous phase.

Symptoms should be monitored at each phase and athletes should not progress if they begin to experience symptoms. Symptoms indicate the need for additional rest. When the athlete is not experiencing symptoms for a minimum of 24 hours, he or she may begin at the previous step where he/she experienced symptoms. Individual athletes will progress through the phases differently and it may take several weeks to complete all 6 phases. Younger athletes typically will take longer than older adolescents.

**When to refer**
If symptoms are persistent for more than 1 month in children, the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

At this time when school-aged athletes are returning for fall sports programs, the pediatrician’s understanding of both the pathophysiology and management of concussion will help him or her to correctly address this common pediatric problem when these youngsters ask, “When can I play?”

For references, go to ContemporaryPediatrics.com/return-to-play
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**Clinical findings**
Well-circumscribed, round, vesiculo-pustular lesions are present in an acral distribution, most commonly on the palms and soles.¹⁻³ Classic AI lesions can be highly pruritic. Pustules are present for 1 to 3 weeks with frequent recurrence. Healed eruptions often leave behind postinflammatory hyperpigmentation with a collaret of scale. Importantly, no scabies mites or burrows are seen.

**Differential diagnosis**
Differential diagnosis for AI remains broad, most commonly confused with scabies, dyshidrotic eczema, transient neonatal pustular melanosis (TNPN), impetigo, and hand-foot-and-mouth disease (HFMD).

**SCABIES**
Scabies can present at any age. In infants, scabies often will have highly inflammatory, serpiginous or J-shaped burrows with papules and nodules in comparison to the circu lar vesicles and pustules of AI.⁷ Family members often have a history of similar pruritic lesions. Scabies is not recurrent if the patient and family are properly treated with permethrin cream.

**DYSHIDROTIC ECZEMA**
Dyshidrotic eczema (pompholyx) is a recurrent bullous or vesicular eruption that usually symmetrically affects the palmoplantar skin and is associated with intense pruritus.⁸ Unlike AI, dyshidrotic eczema can present at any age and is more likely to have tense bulla formation.

**TNPN**
Transient neonatal pustular melanosis presents at birth with vesiculopustular lesions that easily rupture 24 to 48 hours after onset, leaving behind hyperpigmented macules.⁹ It commonly affects the trunk and extremities unlike the acral distribution of AI, although it is not recurrent and is often asymptomatic.

**IMPETIGO NEONATORUM**
Impetigo neonatorum is classically seen in the newborn period with the combination of superficial pustules, vesicles, and bullous lesions.¹⁰ Unlike AI, impetigo lesions generally occur on the face and flexural surfaces with culture positive for *Staphylococcus aureus*.

**HFMD**
Hand-foot-and-mouth disease is most commonly caused by coxsackievirus with distinctive, symmetric, 2-mm-to-4-mm, round clustered papulo-vesicles that often become crusted on an erythematous base.¹¹ Lesions typically occur on the distal extremities including the palms, soles, buttocks, and around the mouth. Lesions may be itchy but are often asymptomatic, and tend to occur most densely in areas where the skin is injured, such as in patches of eczema, burns, or other minor trauma. Unlike AI, HFMD is not recurrent.

**Management**
First-line therapy remains moderate-to-high potency topical corticosteroids.⁶ Systemic antihistamines also have been used for pruritus relief.

**Patient outcome**
The patient was started on high-dose topical steroid with clobetasol to both feet sparingly for 1 to 2 weeks, resulting in a dramatic decrease in scratching. Emollients were continued 2 to 3 times a day and the topical steroid was used intermittently up to twice daily only as needed.

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Dr Woodard is a third-year pediatric resident at Johns Hopkins All Children’s Hospital, St. Petersburg, Florida. Dr Cohen, section editor for Dermcase, is professor of Pediatrics and of Dermatology, Johns Hopkins University School of Medicine, Baltimore, Maryland. The author and section editor have nothing to disclose in regard to affiliations with or financial interests in any organizations that may have an interest in any part of this article. Vignettes are based on real cases that have been modified to allow the author and editor to focus on key teaching points. Images also may be edited or substituted for teaching purposes.

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For references, go to ContemporaryPediatrics.com/dermcase-0818

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Boy with red bumps all in a row
ContemporaryPediatrics.com/dermcase-0718

Teenager with sudden diffuse dermatitis
ContemporaryPediatrics.com/dermcase-0618

White patches signal a pigmentary disorder
ContemporaryPediatrics.com/dermcase-0518
Infant’s pustular eruption is not scabies

ALYSSA WOODARD, MD; BERNARD COHEN, MD

An anxious mother brings her healthy 4-month-old daughter for evaluation of itchy pustules on both hands and feet. The eruption has persisted despite 2 courses of permethrin for scabies. The infant also was diagnosed with hand-foot-and-mouth syndrome and dyshidrotic eczema, but neither of these diseases fit clinically.

ACROPUSTULOSIS OF INFANCY

Discussion

Acropustulosis of infancy (AI) is characterized as a recurrent, pruritic pustular eruption that commonly involves hands and feet. Lesions first present at 2 to 3 months of age. Pustules generally remain for 1 to 3 weeks with frequent recurrences every few weeks to months. The chronic, repetitive nature gradually declines in severity before resolution around age 3 years.

The true etiology of AI is unknown. It is often misdiagnosed as recurrent scabies leading to multiple doctor visits and unnecessary treatment with permethrin cream. The misdiagnosis causes families to be frustrated and discouraged. Also, AI has been identified after scabies infection particularly in the developing world. However, the connection between AI and scabies remains unclear. Acropustulosis is frequently reported in internationally adopted children, possibly because of previous crowded and unsanitary living conditions that may predispose to scabies infestation.

For more on this case, turn to page 37.
8 golden rules for back-to-school

This month marks the return to school for many of your patients. Here are some tips to help both students and their parents get a good start.

1. Preschool is as much about socialization as preacademics. A child does not need to learn to read before kindergarten but should be taught to love books.

2. Parental control of electronic equipment often has eased up over summer vacation. If needed, parents should reestablish ground rules for the school year.

3. Although exercise is, of course, to be encouraged, do not casually clear the otherwise healthy obese child for sports without restrictions. At the least, order gradual conditioning to get him or her in shape.

4. Please do not give a medical exemption for parents who refuse indicated vaccines.

5. Children with attention-deficit/hyperactivity disorder (ADHD) often have associated learning disabilities. Medicine will not help the latter, which need to be treated educationally by the school. Help the parents push the school for proper evaluation and support (eg, by writing a letter requesting so-called 504 accommodations).

6. I like to get Vanderbilt assessment scales on elementary school children with ADHD early, rather than waiting until teacher conferences. I find doing these with the first medication refill after school has started is a good way to remember to do this.

7. Hyperlexia (recognizing words) is seen in many children with autism. Without comprehension, it is not indicative of advanced reading.

8. This is a clinical observation, not specifically evidence based, but I do not believe that red-shirting a child (ie, delaying school entry despite being of age) because he or she has a late birthday is a good idea if the child is intellectually ready. As a former short boy with a late birthday, I admit to some bias here.

REFERENCE


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