



PEDIATRIC FORUM

A journal of The Children's Medical Center of Dayton



A Primer on the Pediatric Inguinal Hernia *Page 3*

Platelet Function Disorders in Adolescents with Menorrhagia *Page 6*

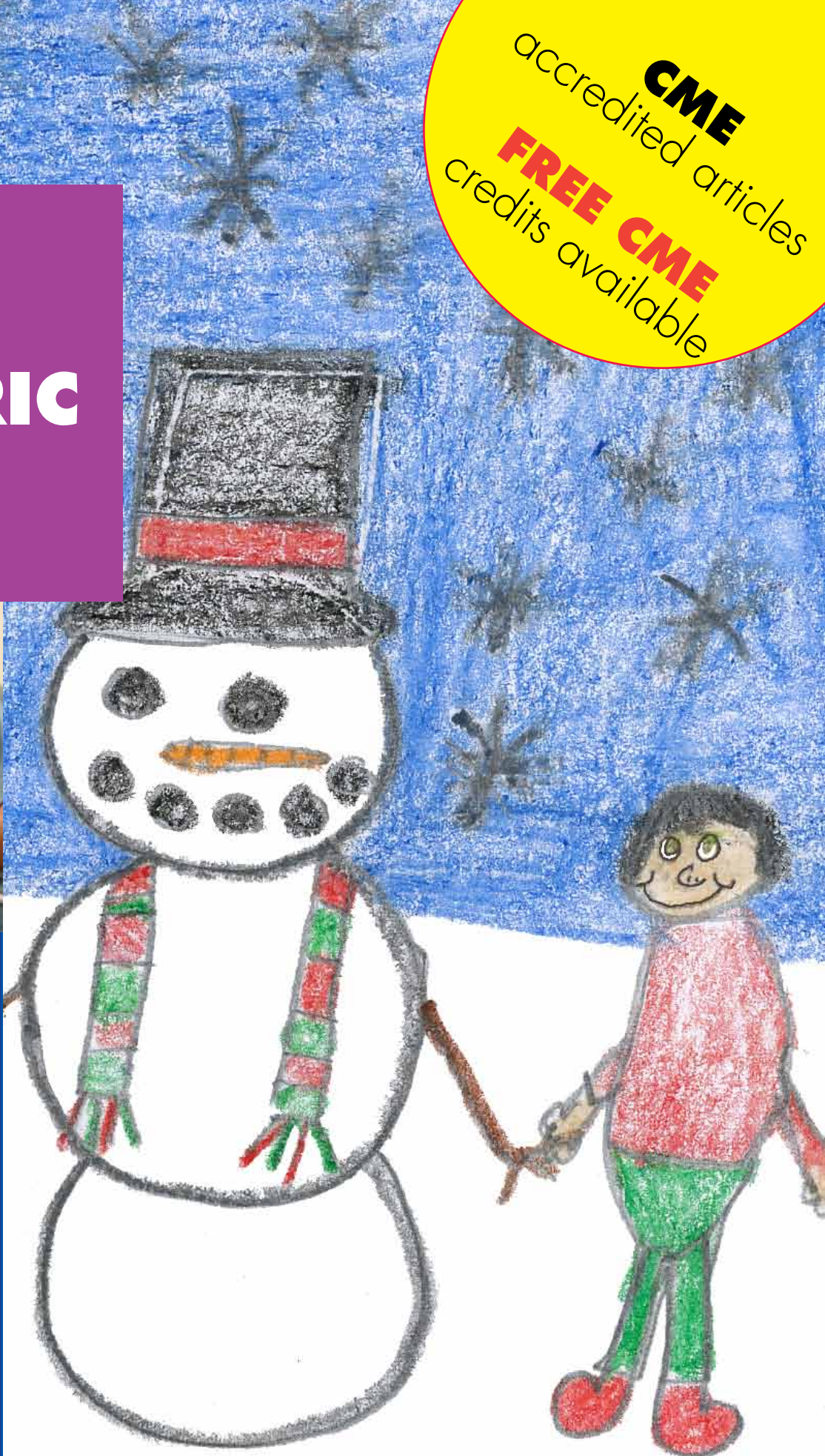
Common Pediatric Manifestations: Scabies and Head Lice *Page 10*

Tonsillectomy Procedures Changes *Page 14*

News and Updates *Page 16*

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

Educational objectives

- Articles will review commonly encountered clinical conditions and provide updates in pediatric medical and surgical care.
- Each individual article will have activity-specific learning objectives.

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A PRIMER ON THE PEDIATRIC INGUINAL HERNIA



By Jeffrey
Pence, MD

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He has special interest in pediatric surgical
oncology, pediatric minimally-invasive
surgery and neonatal surgery.

OBJECTIVES

After completing this
article, the reader should
be able to:

1. Define and identify the causes of an inguinal hernia.
2. Be familiar with diagnosis and treatment processes for inguinal hernias.
3. Discuss the possible outcomes of pediatric inguinal hernia repair.

WHAT IS AN INGUINAL HERNIA?

A *hernia* occurs when an abnormal opening exists in the lining of the abdominal wall, resulting in the passage of fluid, tissue and/or organs through this defect and into a pouch, or sac. Externally, this protrusion appears as a typically soft bulge beneath the skin. A hernia occurring within the region of the groin or genital area is specifically termed an *inguinal hernia*. If the opening is sufficiently small in size and allows only the passage of fluid, then the term *communicating hydrocele* may be used to describe this form of inguinal hernia.

WHAT CAUSES AN INGUINAL HERNIA?

An inguinal hernia of childhood, termed an *indirect* or *congenital* inguinal hernia, typically forms due to a failure of completion of normal development. In fetal development, the formation of inguinal hernias is associated with the developing gonadal structures. In males, the testes typically descend into the scrotum in association with an outpouching of tissue called the *processus vaginalis*. Normally, this outpouching begins to close between weeks 36 to 40 of gestation or around the time of birth. Delayed closure or persistence of this opening throughout childhood, termed *patent processus vaginalis*, is deemed the etiology of the indirect inguinal hernia. In girls, a parallel development occurs as the round ligament of the uterus descends into the labia along the *processus vaginalis*. A similar lack of obliteration, or retained patency, would form the basis of the congenital inguinal hernia in the female. In contrast to the indirect inguinal hernia of children, the adult form of an inguinal hernia,

called a *direct* or *acquired* inguinal hernia, forms through a progressively weakened area of muscular lining in the abdominal wall. Direct inguinal hernias are encountered in less than five percent of all childhood hernias.

HOW COMMON IS AN INGUINAL HERNIA IN CHILDHOOD?

Inguinal hernias are observed in approximately one to four percent of all children. Males are significantly more afflicted (90 percent) than females. Inguinal hernias in children may be observed at any age; however, approximately one-third of childhood hernias are noted by six months of age. Given both the earlier descent of the left testis and closure of the patent *processus vaginalis*, the right side is more commonly involved (60 percent) in males than the left. Bilateral inguinal hernias are observed in ten percent of all children, but more commonly in females. Risk factors for the development of childhood inguinal hernias include prematurity, family history and other medical conditions that may predispose to increased abdominal pressure, such as chronic pulmonary disease or ventriculoperitoneal shunting.

HOW ARE INGUINAL HERNIAS DIAGNOSED?

The majority of inguinal hernias are diagnosed following the observation of a bulge or swelling within the inguinal, scrotal, or labial areas. Swelling or bulging of the hernia sac reflects filling of its lumen with fluid and/or abdominal organs. In boys, this usually involves a segment of intestine, specifically the more mobile small intestine. In females,

the ovary may enter the hernia, in addition to the intestine. The swelling is typically transient in nature, being most noted upon crying, standing or straining. Relaxation, including reclination, will often result in partial to complete reduction of the swelling. Physical examination remains the standard for diagnosing an inguinal hernia. Radiological procedures, including ultrasonography or computed tomography, are typically not helpful in establishing the presence of an inguinal hernia. Most inguinal hernias remain asymptomatic through surgical repair. Most notably, inguinal hernias are not typically painful. Conversely, tense and/or persistent swelling may be attributable to abdominal organs becoming trapped within the hernia sac, a condition known as “incarceration.” Any suspicion of incarceration mandates immediate attention to confirm, or refute, the reducibility of the hernia contents. Incarceration has been observed in approximately one-third of all inguinal hernias, with prematurity accentuating this risk of incarceration. Incarcerated inguinal hernias may well become symptomatic if not addressed in a timely fashion. Symptoms of incarceration may include a tense groin mass in association with focal pain, overlying skin discoloration, abdominal distension and/or vomiting. In this case, the contents of the inguinal hernia sac, likely intestine, may become damaged from progressive swelling and/or compromised blood flow, a condition known as “strangulation.” While fortunately rare, strangulation has been reported to occur in approximately five percent of incarcerated inguinal hernias.



HOW ARE CHILDHOOD INGUINAL HERNIAS TREATED?

Clinical inguinal hernias identified in children do not spontaneously resolve, or heal themselves; and as such, inguinal hernias mandate surgical repair to avoid the risks of incarceration and/or strangulation. In general, reducible, but otherwise asymptomatic, inguinal hernias do not require emergent repair; however, their repair need not be delayed without cause. At times, hydroceles may be observed through infancy if there is a question of communication with the abdominal cavity through a patent processus vaginalis. Communicating hydroceles are indeed approached surgically as inguinal hernias. In premature infants, the timing of surgical repair is somewhat controversial. In these individuals, one must balance the risks of anesthesia and technical complications during an earlier repair on a small, immature baby with the potential complications of incarceration, strangulation and hernia progression developing from a more delayed operative approach. No current experi-

ence suggests superiority of either approach.

The classic repair of an indirect inguinal hernia was described more than a century ago. This repair has remained largely unchanged since its original description. The repair incurs an open incision through which the communication traversing the abdominal wall to the groin is surgically obliterated, otherwise known as a high ligation, typically using suture(s). More contemporarily, the repair of a pediatric inguinal hernia using a minimally-invasive, or laparoscopic, technique was initially reported in 1997. In the various modifications of this minimally-invasive technique, a high ligation of the hernia sac is essentially performed internally. The long-term outcome of this alternative approach to inguinal hernia repair in children continues to evolve. As such, its use has not yet supplanted the traditional open technique of repair. As an additional alternative, the use of prosthetic material, or mesh, is virtually never utilized during the repair of a childhood inguinal hernia, given the unknown lifelong consequences of its use in youth.

WHAT IS THE MEANING OF CONTRALATERAL EXPLORATION?

Five decades prior, it was reported that occult contralateral inguinal hernias were present in as many as forty percent of children undergoing unilateral inguinal hernia repair. From this observation, and subsequent others, a standard of care dictating contralateral exploration of the non-involved groin in children undergoing unilateral inguinal hernia repair evolved. More recently, this once commonplace practice is now debated following the observation that the delayed development of a clinical, contralateral (“metachronous”) inguinal hernia was seen in only seven percent of individuals having a prior unilateral inguinal hernia repair. It was therefore clear that not all presumptive patent processus vaginales would ultimately progress into clinical inguinal hernias over time. As such, the decision balancing the risks of concurrent contralateral inguinal exploration (which include testicular, vasal, and/or inguinal floor injuries) with the risks of delayed contralateral inguinal hernia development (including a second anesthetic event for eventual repair and incarceration) must ultimately be struck in each case. The advent of laparoscopic exploration has somewhat temporized this debate by offering a diagnostic measure short of open exploration with its associated risks while avoiding the risk of metachronous presentation and repair. Despite some technical aspects which may preclude successful “screening,” this diagnostic tool offers minimal to no statistical risk during unilateral inguinal hernia repair.

WHAT ARE THE OUTCOMES OF PEDIATRIC INGUINAL HERNIA REPAIR?

In general, the classic repair of the childhood inguinal hernia has significantly favorable, lifelong results. A recurrence rate of approximately one to two percent may be expected. Recurrence rates may be higher in repairs performed in certain populations of children, such as in the premature infant, in those children with comorbid conditions, including malnutrition or chronic pulmonary disease, and in those involving incarceration or strangulation. Surgical site infections occur exceedingly

infrequently, with or without the administration of perioperative antibiotics. Wound infection rates under one percent should be achieved. Important potential complications in male children may include resultant testicular injury or injury to the vas deferens. Testicular injury or iatrogenic cryptorchidism may occur in frequencies approaching three to four percent. Injury to the vas deferens may be noted in up to one percent of males. In females, while exceedingly rare, injury to the ovary and/or fallopian tube may occur, particularly in situations of incarceration.

CME QUESTIONS

1. An inguinal hernia of childhood typically forms due to a failure of completion of normal development.
 - a. True
 - b. False
2. The majority of inguinal hernias are diagnosed following the observation of a bulge or swelling within the trachea.
 - a. True
 - b. False
3. In general, the classic repair of the childhood inguinal hernia has significantly favorable, lifelong results.
 - a. True
 - b. False

Questions? Comments?

Contact Jeffery Pence, MD, at pencej@childrensdayton.org.

PLATELET FUNCTION DISORDERS IN ADOLESCENTS WITH MENORRHAGIA: PRESENTATION PROFILE WITH DIAGNOSTIC AND TREATMENT OPTIONS

By Lawrence Amesse,
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OBJECTIVES

After completing this article, the reader should be able to:

1. Identify whether a platelet function disorder may or may not be present in the patient.
2. Discuss the hormonal and non-hormonal treatments for menorrhagia.

Menorrhagia represents a worldwide public health challenge.¹ In the United States 5-10% of reproductive-age females will seek medical attention for this disorder and within a year, half of these women will have some type of surgical intervention.^{2,3} In adolescents, excessive menstrual bleeding is a frequent complaint and will affect one third of all females achieving menarche.⁴ The impact of this disorder is particularly significant in this population. Menorrhagia is associated with significant morbidity and negatively influences school attendance, social activities, sports participation and psychosocial well-being.⁴

In approximately half of the cases, peri-menarcheal menorrhagia is attributed to immaturity of the hypothalamic-pituitary-ovarian (HPO) axis. HPO immaturity is a diagnosis of exclusion and additional testing to determine the presence of an underlying endocrine disorder or bleeding diatheses should be conducted. Indeed, bleeding disorders, such as von Willebrand disease (VWD), platelet function disorders and other coagulation deficiencies, are prevalent among adolescents with menorrhagia. However, they often go unrecognized and undiagnosed, which results in

suboptimal treatment.^{4,5} Awareness of VWD has been heightened, while platelet function disorders are infrequently considered.⁵

PLATELETS FUNCTION DISORDERS

Platelet function disorders (PFDs) are a large, heterogeneous group of hemostatic defects that have received increased attention as an etiology of menorrhagia. Indeed, recent studies indicate that PFDs may be more prevalent than VWD in young females with menorrhagia.⁴⁻⁶

Inherited platelet function defects can be quantitative, qualitative or both. Quantitative defects are seen in disorders associated with thrombocytopenia, whereas qualitative defects reflect alterations in adhesion, aggregation or secretion (Table 1).⁷ Secretion defects are the most common congenital PFDs, with Storage Pool (SP) defects the most frequent subtype.⁷ This finding is reflected in our patient population, where 64% of adolescent females with menorrhagia have SP defects.⁸

Table 1 Classification of Inherited Qualitative Platelet Function Disorders

<i>Defect</i>	<i>Disorder</i>
Adhesion	Bernard-Soulier syndrome von Willebrand disease including platelet-type
Aggregation	Glanzmann's thrombasthenia Congenital afibrinogenemia
Secretion and: Granule anomalies	Storage pool deficiency (α , δ , $\alpha\delta$ granules) Quebec platelet disorder
Signal transduction errors	Platelet receptor defects G-protein activation defects Phosphatidylinositol metabolism defects Calcium mobilization defects Protein Phosphorylation defects Arachadonic acid/thromboxane A2 synthesis defects
Cytoskeleton	Wiscott-Aldrich syndrome
Membrane phospholipids	Scott syndrome

(Adapted from Handin RI, Inherited platelet disorders. Hematology Am Soc Hemato, 2005.)

In SP defects, either granule numbers or contents are altered, with defects seen in dense (δ)-granules, α -granules or combined $\alpha\delta$ -granules.⁷ Of these, δ -granule deficiency is the most common and this finding is also observed in our population of adolescents.^{7,8} While dense (δ) granule deficiency can be associated with such rare syndromes as Hermansky-Pudlak and Chediak-Higashi, the majority of presentations occur in otherwise normal individuals.⁹

DIAGNOSTIC EVALUATION

Presentation Profile

Adolescents presenting with menorrhagia require careful evaluation and this begins with assessment of the presentation. While bleeding severity may range from mild to severe among various PFDs, the hallmark characteristic is rapid onset of bleeding during or after a hemostatic challenge such as menstruation.⁹ Often these young girls will present to the emergency room with heavy uterine bleeding and severe anemia (hemoglobin levels 4-5mg/dL), at menarche commencement.^{8,9} Severe cases may require blood transfusions along with pharmacologic intervention. However, the more common presentation is an adolescent with chronic menorrhagia. This more subtle presentation often represents a diagnostic dilemma for clinicians since it is unclear whether a full diagnostic evaluation is indicated. Often the hemoglobin levels are in the low normal ranges, and because of the patient's young age and inexperience with menstruation, quantitation of blood loss can be difficult to assess.

Bleeding History

PFDs are recognized as one of the more challenging bleeding conditions to evaluate, both clinically and by laboratory testing.⁹ Directed questions regarding the bleeding history will assist the clinician screen

for a suspected PFD. The questions include epistaxis occurrences (1-2 episodes/month); easy bruisability (1-2 bruises >5cm/month), with bruising that tracks downward towards the feet; gingival bleeding; bleeding with and/or following dental procedures, surgery and/or trauma; and family history of bleeding, particularly relative(s) with menorrhagia.^{8,9} Determining the onset of bleeding after a hemostatic challenge can sometimes distinguish qualitative from quantitative PFDs and other bleeding diatheses (VWD, factor deficiencies).⁹

When taking the menstrual history, it is important to ask how many days of bleeding in a typical menses, as they are often prolonged (duration >7d.). Patients in this subgroup often consider their heavy menses to be normal, despite missing school and other events. The most common reason for this belief is that menorrhagia is thought to be a family characteristic. Indeed, a common theme will emerge from interviewing the patient and her family: the menstrual bleeding pattern is similar to that experienced by their mother, sisters, aunts and even grandmothers, many of whom had hysterectomies at an early age due to heavy menstrual bleeding.⁸ Since the majority of adolescents with underlying bleeding diatheses have menorrhagia since menarche, it is also important to ask when the heavy bleeding was first noticed. Family histories of bleeding tendencies can also assist in identifying PFDs.⁸

Physical Examination

The presence of petechiae, ecchymosis and purpura as well as any signs of anemia should be documented. Pelvic examinations are often difficult in this age group, and an abdominal ultrasound of the pelvis in the non-sexually active teenager is often preferred.

Laboratory Evaluation

Diagnostic laboratory studies can be challenging and clinicians should be aware of diagnostic test limitations. No gold standard diagnostic test exists owing to the heterogeneous nature of PFDs. Standardization of available tests is limited with different laboratories showing variation in platelet function assays. Additionally, no guidelines have been established on whether to perform platelet screening or to begin the diagnostic evaluation with specialized testing, all of which are known to have frequent imprecise results. Guidelines regarding sample procurement, processing and analysis have been established, but no guidelines on test interpretation or how to diagnosis a specific PFD are available.⁹

A common diagnostic approach is to begin with a CBC and platelet counts along with assessment of platelet size and morphology to exclude or detect any associated syndromes. When the blood sample parameters are normal, quantitative platelet disorders can be excluded. Platelet function screening tests are usually the next step towards diagnosing platelet dysfunction. Patients should discontinue as many of the following medications as possible 7-10 days prior to testing: aspirin, NSAIDs, tricyclic antidepressants, SSRIs and some antibiotics.⁸

The platelet function analyzer-100 closure time (PFA-100 CT) is considered an important screening test for detecting bleeding diatheses and has virtually replaced the template bleeding time test, which is still used occasionally in a few experienced labs. However, it lacks adequate sensitivity and specificity to be used exclusively as a screening test for PFDs. Other laboratory testing can include PT and aPTT, although they are neither sensitive nor specific for PFDs.⁹ The von Willebrand panel (factor VIII levels, VWF antigen and ristocetin cofactor activity) can

be performed at the same time to exclude VWD. Of course, an evaluation of an adolescent female with heavy uterine bleeding should always include β -hCG levels to exclude pregnancy.

When the screening PFA-100 CT results are positive (ie, abnormal), additional confirmatory studies such as platelet aggregation assays are performed. Correspondingly, when the PFA-100 CT results are negative (ie, normal), our experience indicates that in some cases performing platelet aggregation assays can detect the presence of a PFD despite normal screening.^{8,9}

Platelet aggregation assays are relatively inexpensive, widely available and can be useful in differentiating some PFD subtypes. However, not

all SP defects, particularly δ -granule deficiencies, can be detected by this modality.¹⁰ In our experience, electron microscopy (EM) of platelet samples should be considered in cases where the aggregation assay is negative, but the family history is positive for bleeding tendencies.⁸ EM accurately identifies ultrastructural abnormalities such as δ -granule deficiencies. However, it can only be conducted at specialized centers with a highly-trained staff.

TREATMENT

Multiple approaches are available for the treatment of PFDs. Therapeutic choices, in general, depend on the severity of the bleeding and combining different methods is an option. Some recommended modalities are summarized in Table 2. When the first

presentation is acute uterine bleeding and significant blood loss, platelet function and factor deficiency studies will not be readily available. Thus, treatment must be started without lab results and is usually similar to the approach used for VWD.

Hormonal

In patients with acute menorrhagia, one strategy is to treat with combined oral contraception pills (OCPs). The exact mechanism of action is unknown but it is thought that elevated estrogen levels increase clotting factor levels and promote platelet aggregation. A first generation OCP such as Ovral® (50 μ g ethinyl estradiol and synthetic progestin) is administered one tablet PO every six hours. The dose is incrementally decreased when the bleeding stops, which is usually ~24 hours after commencing treatment. High doses of estrogen are often associated with nausea, and anti-emetics (e.g. Zofran®) may need to be prescribed. Some clinicians combine OCPs with non-hormonal therapy, discussed below. Patients presenting with less severe bleeding can be effectively treated with second or third generation OCPs (e.g. Desogen®) and this may be sufficient to control menstrual bleeding.

Intrauterine Devices (IUD): Intrauterine devices are another option for controlling menorrhagia in patients with PFDs, and this strategy is receiving increased attention. The Minera® IUD is preferred since it contains progesterone, which tends to cause endometrial atrophy. However, IUDs are not recommended in adolescents with a history of sexually transmitted diseases or who have had multiple sexual partners.

Non-hormonal

DDAVP (1-diamino-8-D-arginine vasopressin; Stimat®): Non-hormonal treatment with DDAVP is often preferred in some patients. In acute cases where there is significant

Table 2 Recommended Strategies for Treating Adolescent Menorrhagia due to PFDs	
Therapeutic Modality	Dosage/Notes
Hormonal	
<i>Acute presentation</i> 1st generation, combined OCP (e.g. Ovral®) Anti-emetic (e.g. Zofran®) PRN Nausea	One tab Ovral® PO q 6hrs until bleeding stops, then ↓ dose to one tab q8hr x 3days, then one tab bid x 2days, then 1 tab each day
<i>Stable presentation</i> 2nd or 3rd generation OCPs (e.g. Desogen®) Intrauterine Devices (IUD) (Minera®)	One tab of Desogen® PO q 12hrs until bleeding diminishes/stops, then continue one tab daily Not advised with Hx of STDs &/or multiple sexual partners
Non-hormonal	
<i>Acute presentation</i> Desmopressin (DDAVP®) Aminocaproic acid (Amicar®) Platelet Transfusion	0.3 μ g/kg DDAVP® IV in 30ml of saline in 30min infusion 100 mg/kg Amicar® IV or PO followed by 50mg/kg IV or PO qhr until heavy bleeding is controlled (5-7 days). Maximum dose is 30g. Reserved for patients w/documented PFDs refractory to pharmacological regimens; pediatric hematologist consult
<i>Stable presentation</i> DDAVP nasal spray (Stimat®) Tranexamic acid (Lysteda®)	150 μ g/kg Stimat®, if weight < 50kg; one squirt in one nostril; if weight \geq 50kg; one squirt to both nostrils 650-1300mg PO tid x 5days
Combined therapies may be indicated:	
<i>Acute presentation</i> OCP + DDAVP® OCP + Amicar®	Combined dosages of OCPs & DDAVP® Combined dosages of OCPs & Amicar®

(Approved by FDA 11-13-09)

blood loss, the first line of therapy is IV administration of 0.3µg/kg desmopressin (DDAVP®) in 30ml of saline as a 30 minute infusion. In stable patients, a common regimen is to administer 150 µg DDAVP (Stimate®) via nasal spray with one squirt per nostril for patients with weight <50kg, and one squirt to both nostrils for weight ≥ 50kg. The dose is given every 24 hours for the first 3 days of the menses.

Fibrinolysis inhibitor: In this modality, a fibrinolysis inhibitor (e.g. aminocaproic acid; Amicar®) is initially administered at the usual dosage of 100 mg/kg either IV or PO followed by 20mg/kg IV or PO each hour until bleeding is controlled.

Platelet Transfusion: Transfusion of platelets should be reserved for patients with documented PFDs for whom serious uterine bleeding is unresponsive to other treatment regimens and with the consultation of a pediatric hematologist.

CONCLUSION

Adolescent menorrhagia is a common condition with multiple etiologies including bleeding disorders. Although VWD is the most common and best-known bleeding condition associated with adolescent menorrhagia, PFDs are now emerging as an important etiology and should be considered in all adolescents with heavy menstrual bleeding. Clinical awareness of the prevalence of PFDs in adolescent menorrhagia is the cornerstone towards diagnosing these disorders early in the evaluation. Early diagnosis leads to optimal treatment strategies and is crucial to preventing untoward complications and morbidity associated with menorrhagia.

DECLARATION OF AWARDS

Dr. Lawrence Amesse is the recipient of a grant to study platelet function disorders in adolescents

with menorrhagia from the CSL Behring Foundation. Drs. Pfaff-Amesse and French and Ms. Duffy are co-investigators.

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CME QUESTIONS

4. Recent studies indicate that platelet function disorders are as prevalent as von Willebrand Disease in adolescents with menorrhagia.
 - a. True
 - b. False
5. Storage pool defects are the most frequent subtype of PFD.
 - a. True
 - b. False
6. Most adolescent girls with storage pool defects present with severe menorrhagia.
 - a. True
 - b. False
7. The heterogeneous nature of PFD makes standardization of laboratory testing difficult
 - a. True
 - b. False
8. Which of the following will interfere the platelet function assay.
 - a. NSAIDS
 - b. Tricyclic antidepressants
 - c. SSRI
 - d. Antibiotics
 - e. All of the above

Questions? Comments?

Contact Lawrence Amesse, MD, PhD, HCLD, at lsamesse@mvh.org.

WHAT'S BUGGING YOUR KIDS?

COMMON PEDIATRIC INFESTATIONS- SCABIES AND HEAD LICE



By Julian
Trevino, MD

Julian Trevino,
MD, is a pediatric
dermatologist with 15
years of experience

at the pediatric dermatology clinic at Dayton Children's. Dr. Trevino is interim chair of the department of dermatology at Wright State University Boonshoft School of Medicine and program director for the dermatology residency program.

and

Amy Y-Y Chen, MD

Amy Y-Y Chen, MD, is a resident in the dermatology residency program, department of dermatology Wright State University Boonshoft School of Medicine.

OBJECTIVES

After completing this article, the reader should be able to:

1. Describe the etiology and epidemiology of scabies and head lice.
2. Understand the clinical manifestations and treatment of scabies and head lice in the pediatric population.
3. Understand risks and benefits of treatment options, treatment recommendations for people or household items in close contact with an infested individual and environmental decontamination of scabies and head lice.

Infestations of scabies and head lice are common problems encountered in the pediatric primary care setting. Infestations are sources of distress for parents, children and school officials. Recognizing the cutaneous manifestation of these disease entities is important so treatment can be promptly and effectively initiated. Transmission among close contacts of infested individuals has important implications for optimal management of these infestations. This article will discuss the etiology, clinical presentations, diagnosis and well-established treatment options for scabies and head lice in pediatric populations.

WHAT IS SCABIES?

The human scabies mite, *Sarcoptes scabiei var hominis*, infests the epidermis causing human scabies. Although the disease affects all age groups, races and social classes, crowding and lack of proper hygiene are risk factors for the disease.¹ Scabies is transmitted directly by skin to skin contact or indirectly by fomites. Mites complete their entire life cycle on humans, and female mites burrow into the stratum corneum to lay their eggs, which hatch in 3-4 days.² The average number of mites present in a normal host is 10-12.³

Pruritus is the most significant symptom of scabies; it is the secondary immune response to mites and their feces. This immune response takes approximately four to six weeks to develop following the initial exposure.² Additionally, infants and young children may exhibit irritability and poor appetite. On physical examination, a polymorphous eruption, which often includes papules, vesicles, nodules, excoriations and burrows (linear, tan or skin color ridges with a minute vesicle or papule at the end of the burrow)

can be found in the interdigital web spaces of fingers and toes, axillae, volar surfaces of the wrist, around the nipples, umbilicus and in the genital areas. Infants with scabies often have papules and vesicles on the palms, soles, face and scalp— unusual locations for lesions in adults and older children.^{2,4} (Figures 1 and 2) Scabetic nodules, which may mimic neoplastic disorders, can be present in the axillae and genital areas, particularly in infants and young children. Neonates and infants may also develop crusted scabies due to the immaturity of their immune system.⁵ In older children, crusted scabies is almost always associated with immunosuppression, genetic or neurological illness.¹

Figure 1



Figure 2



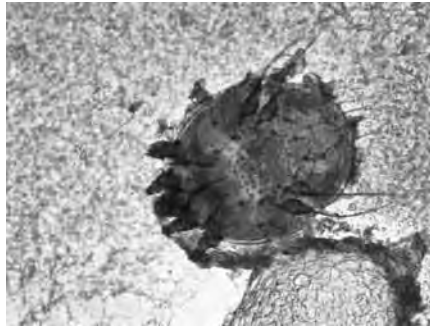
Scabies is diagnosed clinically by the presence of burrows and is supported by visualization of mite, feces or eggs under oil immersion from scraping of the skin (Figure 3). Skin scrapings should be obtained from non-excoriated lesions at multiple affected sites to increase the probability of a positive scabies preparation. If a high degree of suspicion for scabies exists based on the history (particularly a history of rash or pruritus exists in close contacts of the patient) and clinical examination, a positive scabies prep is not mandatory for a presumptive diagnosis of scabies.

A number of different topical agents have been used for the treatment of scabies. Keep in mind that effective treatment of scabies involves not only treatment of the patient, but also identification and treatment of close personal contacts. Time is well-spent in instructing parents on proper application of these topical agents. Treatment “failures” can often be traced to improper application of topical medications or inadequate treatment of close contacts. Additionally, environmental decontamination should be reviewed with parents.

TOPICAL TREATMENTS FOR SCABIES

Permethrin 5% cream (Elimite, Acticin), a synthetic pyrethroid, is an FDA-approved treatment for scabies. It acts by causing paralysis and death of mites. It is pregnancy category B and is safe in children older than two months. In special situations, permethrin could be prescribed for neonates.⁶ Permethrin is applied at bedtime to skin from the neck down including under fingernails. For infants and children with lesions of the head and neck, spot treatment to these lesions (avoiding application near the eyes and mouth) is prudent.

Figure 3



Permethrin is left on for 8-12 hours then rinsed off. The treatment should be repeated in one week to increase the cure rate. Side effects of permethrin include burning and stinging of the skin.¹ Treatment of not only the patient, but of all close contacts as well, is essential to effectively eradicating the infestation.

Lindane is available as 1% shampoo or lotion by prescription. Lindane is used as a second-line treatment for scabies and only if patients cannot tolerate or fail first-line therapies.² Lindane 1% shampoo is applied to dry hair and washed off after four minutes. The lotion is applied from the neck down and should be left on the skin for eight hours before washing off. Lindane should be used with caution in infants, children, those weighing less than 50 kg and patients with preexisting skin conditions, as these individuals may have increased neurotoxicity. Lindane is contraindicated in premature infants and those with known seizure disorders. Its use has been banned in California. It is pregnancy category C.^{2,7}

Precipitated sulfur 2-10% in petrolatum is a time-honored treatment and safe to use with pregnant women, infants and children. The ointment is applied to all body surfaces for two to three consecutive nights. However, use of this preparation has fallen out of favor due to it being messy and smelly. Additionally, it stains clothes and can cause irritant dermatitis.

Ivermectin, an oral agent, approved by the FDA for treatment of strongyloides and onchocerciasis, has been used off-label for treatment of scabies. Ivermectin acts by producing paralysis and death in mites.⁸ For treatment of scabies, it is usually given as a single oral dose of 200 mcg/kg. Because it lacks ovicidal activity, some repeat the treatment at intervals of one and two weeks.^{9,10} More common adverse reactions to ivermectin include fever, headache, chills and arthralgia. More serious adverse effects including ataxia, tremors, coma and death have also been reported.¹¹ Ivermectin may be considered in the management of patients with treatment-resistant scabies, immunocompromised patients with recalcitrant crusted scabies or to control scabies outbreaks in closed communities (eg, prisons or long-term care facilities).¹²

Advise parents that because of the hypersensitivity phenomenon, pruritus often remains for up to 4 weeks after effective treatment.¹³ Prescriptions for topical steroid preparations and antihistamines can be supplied to provide symptomatic relief from pruritus during this period. As discussed previously, all household contacts of the infested individual also should be treated. Most recurrences of scabies are the result of reinfestation from untreated contacts.

In addition to topical treatment, most practitioners also recommend some level of environmental decontamination. Washable linens, bedding and clothing should be laundered with a minimum water temperature of 50°C or with a dry cycle of at least 40 minutes.² Stuffed animals and similar items should be placed inside a sealed plastic bag for one week.

HEAD LICE (PEDICULOSIS CAPITIS)

Head lice infestation, caused by *Pediculus capitis var humanus*, is most commonly seen in girls between the ages of 3-12. It may be transmitted by direct contact or from fomites (combs, brushes, hats, helmets, etc). Adult lice and nymphs can live for three days and nits can live for 10 days away from human host.¹⁴ Head lice measure about 1-2 mm in length. They can crawl rapidly. The three pairs of clawed legs allow the head lice to maneuver along the hair shaft.²

Pruritus is a common presentation of pediculosis capitis. Excoriations are often present, particularly on the posterior neck and upper back. Patients may also have cervical lymphadenopathy, conjunctivitis or generalized cutaneous hypersensitivity that mimics a viral exanthem.¹⁵ The gold standard for diagnosis of head lice is direct visualization and identification of a live louse. However, finding a nit cemented to the hair shaft within 1 cm of scalp surface in an untreated patient is highly suggestive of head lice infestation.² The nape of the neck and behind the ears are high yield areas to screen for head lice.^{15,16}

TREATMENT FOR HEAD LICE

Some overlap exists between the treatment of scabies and head lice. Permethrin and Lindane can both be used to treat head lice as well as scabies. Permethrin, which causes paralysis of lice, is available as a 1% cream rinse (Nix) available over-the-counter. It is applied to towel-dried hair after shampooing, left on for 10 minutes then rinsed off. If Permethrin 1% cream rinse is ineffective, permethrin 5% cream, approved for treatment of scabies (see above discussion) can be used off-label for treatment of head lice. The cream is applied and left on for 8-12 hours.

Lindane 1% lotion or shampoo is applied to dry hair and washed off after four minutes.² Neurotoxicity and seizure risk should be carefully considered before prescribing Lindane. Its use is contraindicated in premature infants and those with known seizure disorders. Because of its declining efficacy and potential for severe adverse effects, use of lindane should be considered only in those patients who fail treatment with first-line agents.

Combinations of pyrethrins with piperonyl butoxide (A-200, Licide, Pronto, RID, Tisit, Triple X and R&C) are over-the-counter pediculocides. Pyrethrins are derived from chrysanthemum extract and cause neurotoxicity and paralysis of the lice. Formulations of these products include shampoo, mousse and gel. These products are approved by the FDA for head lice treatment in children older than 2 years. This class of medication is pregnancy category C. These products are pediculocidal but not ovidical. Thus, recommendations are to apply to dry hair on day one and repeat application in 7-10 days.¹⁷ The product should be lathered in, left on for 10 minutes and then rinsed out, preferably by cool water to decrease absorption from vasodilation. Educate parents to apply the appropriate amount of medication. For ear length hair or shorter, 1-2 oz of the medication should be used per application; for shoulder length hair, 2-3 oz should be used per application; for long hair, 3-4 oz should be used per application.

Malathion (Ovide), an organophosphate, is available as a prescription lotion or gel and is FDA-approved

for treatment of head lice in children older than 6 years. It binds to acetylcholinesterase and causes spastic paralysis and subsequent death in lice.¹⁸ Malathion is the most effective therapy for killing lice and their eggs.¹⁹ It is applied to dry hair, left on for 8-12 hours and rinsed off. Application is repeated again in seven to nine days.² The disadvantage of malathion includes its flammable nature, long application time, unpleasant odor and the theoretical (but never documented) risk of respiratory depression if ingested.^{2,16}

Multiple additional treatment modalities for head lice have been used off-label. These include ivermectin and trimethoprim-sulfamethoxazole.^{20,21} The efficacy of these agents in treatment of head lice is not established and their use should only be considered in treatment-resistant cases. Use of occlusive agents (eg, petroleum jelly, mayonnaise) to smother and immobilize lice is a safe alternative to chemical pediculocides, but is of unproven efficacy. Use of nit combs can be effective as an adjunct to treatment with pediculocides, but should not be used as monotherapy.

Treatment of household contacts is needed. Methods of environmental decontamination are similar to those recommended for scabies. In addition, items not machine-washable can be decontaminated by dry cleaning or sealing in a plastic bag for 2 weeks.² Children may return to school following appropriate treatment. Strict "no nit" school policies are unreasonable and result in excess and unnecessary absences for some patients.

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CME QUESTIONS

9. Pruritus typically develops two weeks after acquisition of scabies.
 - a. True
 - b. False
10. Lindane can be safely used for treatment of scabies in neonates.
 - a. True
 - b. False
11. The nape of the neck and behind the ears are high yield areas to examine in suspected cases of head lice infestations.
 - a. True
 - b. False
12. Malathion is the most effective therapy for killing lice and their eggs.
 - a. True
 - b. False

Questions? Comments?

Contact Julian Trevino, MD at julian.trevino@va.gov.

TONSILLECTOMY PROCEDURES

CHANGES



By Adan A. Fuentes, DO

Adan Fuentes, DO, is part of the otolaryngology facial plastics teaching faculty for Ohio University Osteopathic College of Medicine and Grandview Medical Center. He is board certified in otolaryngology and facial plastics.

OBJECTIVES

After completing this article, the reader should be able to:

1. Understand the indications of a tonsillectomy.
2. Know the common pathogens associated with tonsillitis.
3. Understand the variety of tonsillectomy procedures employed by otolaryngologists today.

The tonsillectomy is one of the most commonly performed surgical procedures in the United States today. Recently, the tonsillectomy and its indications received national attention in the political arena.

The American Academy of Otolaryngology-Head and Neck Surgery *Clinical Indicators Compendium* in 1995 published the following indication guidelines for tonsillectomy:

- a. Patient with three or more infections of tonsils and/or adenoids per year despite adequate medical therapy
- b. Hypertrophy causing dental malocclusion or adversely affecting orofacial growth documented by orthodontist
- c. Hypertrophy causing upper airway obstruction, severe dysphagia, sleep disorders or cardiopulmonary complications
- d. Peritonsillar abscess unresponsive to medical management and drainage documented by surgeon, unless surgery performed during acute stage
- e. Persistent foul taste or breath due to chronic tonsillitis not responsive to medical therapy
- f. Chronic or recurrent tonsillitis associated with the streptococcal carrier state and not responding to beta-lactamase-resistant antibiotics
- g. Unilateral tonsil hypertrophy presumed neoplastic

UNDERSTANDING THE TONSILLECTOMY

Group A beta-hemolytic streptococcus is the most common cause of acute tonsillitis and can be associated with sequelae, which includes rheumatic fever and poststreptococcal glomerulonephritis. Numerous other organ-

isms include non-GABHS bacteria and beta-lactamase producing organisms such as *Bacteroides*, nontypable *Haemophilus* species, *staphylococcus aureus*, and *moraxella catarrhalis*. Viral pathogens include adenovirus, coxsackie virus, parainfluenza, enterovirus, parainfluenza, Epstein-Barr virus, herpes simplex virus and respiratory syncytial virus.

Tonsillectomies have been traditionally performed with cold steel techniques or with monopolar cautery. The most common postoperative complications include post-tonsillectomy pain and post-tonsillectomy hemorrhage. The aim to reduce these complications led to the development of new techniques and devices. The use of the harmonic scalpel, microdebrider and coblation are among the newer techniques used. Intraoperative and postoperative hemorrhage, pain, advancement to regular diet and activity, and overall cost of these procedures have been analyzed in many studies.

HARMONIC SCALPEL (ETHICON)

The harmonic scalpel utilizes ultrasonic vibration to cut and coagulate tissues. The cutting mechanism is possible with the sharp blade with a vibratory frequency. The coagulation mechanism occurs by transferring mechanical energy to tissues. This breaks hydrogen bonds of proteins and generates heat from tissue friction. The temperature of the harmonic scalpel (50° – 100° C) is lower than electrocautery (150° – 400° C) and less thermal damage occurs to tissues. Studies show less postoperative pain occurs; however, the harmonic scalpel device is costly.

MICRODEBRIDER (VARIOUS)

Koltai, et al performed a retrospective case series to review the use of intracapsular tonsillectomy using powered shaving instrumentation for managing tonsillar hypertrophy causing sleep disordered breathing in children. A thin rim of lymphoid tissue was left on the capsule. Suction cautery was used for hemostasis. A total of 150 children underwent intracapsular tonsillectomy and 162 children total tonsillectomy. Of statistical significance, the intracapsular tonsillectomy group had lower pain scores at each measured interval in comparison to the total tonsillectomy group. In addition, the intracapsular group also had an earlier return to normal activity and less analgesic use. However, a significant investment is required for the device.

COBLATION (ARTHROCARE)

Coblation is a technique that utilizes a field of plasma, or ionized sodium molecules, to ablate tissues. Bipolar radiofrequency energy is transferred to sodium ions, creating a thin layer of plasma. This effect is achieved at temperatures from 40° – 85° C, in comparison to the harmonic scalpel which can reach temperatures ranging from 50° – 100° C and electrocautery which can reach above 400° C. The reduction in thermal injury to surrounding tissues offers reduced postoperative pain and morbidity. This device can carry a significant cost.

In summary, Dayton otolaryngologists utilize cold techniques, electrocautery, microdebrider, bipolar cautery, suction cautery, the harmonic scalpel and coblation techniques. Surgeon personal preference plays a large role in the technique employed.

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CME QUESTIONS

- 13.** The most common organism associated with bacterial tonsillitis is
 - a. *Moraxella catarrhalis*
 - b. *Haemophilus influenza*
 - c. *Staph aureus*
 - d. *Group A Beta-hemolytic Streptococcus*
- 14.** Coblation tonsillectomy utilizes ionized calcium to disrupt molecular bonds.
 - a. True
 - b. False

Questions? Comments?

Contact Adan A. Fuentes, DO at afuentes@dhms.net.

NEWS AND UPDATES

THE CHILDREN'S MEDICAL CENTER OF DAYTON

MARK YOUR CALENDARS

- ▶ **March 2:** Be an active voice in the future of children's health care by participating in Dayton Children's *Community Conversation* for health care professionals. For more information, call 937-641-3385.
- ▶ **March 12:** Active and courteous staff, we look forward to seeing you at the annual Professional Staff Recognition Banquet at the Dayton Art Institute. For information or to RSVP, call 937-641-3666.
- ▶ **May 13:** Join us at La Piazza in Troy, from 5:30 pm to 7:30 pm, for an evening of continuing medical education. Details to come in early Spring.

Check the For Health Care Professionals section of childrensdayton.org regularly for the latest news and events.



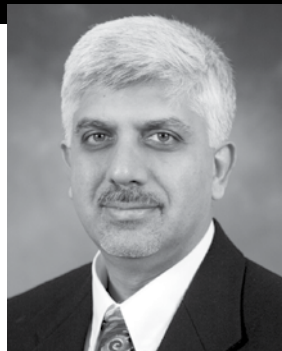
PEDIATRIC LINK E-MAIL NEWSLETTER

Pediatric Link is Dayton Children's new monthly e-mail newsletter for health care professionals. This news-

Dayton Children's welcomes new physicians



Samuel Dzodzomenyo, MD



Aniket Joshi, MD



Laura Hutchison, MD

- ▶ **Samuel Dzodzomenyo, MD,** joined as medical director for Dayton Children's Pediatric Sleep Center.
- ▶ **Aniket Joshi, MD,** joined the department of critical care medicine and Dayton Children's award-winning pediatric intensive care unit (PICU).

- ▶ **Laura Hutchison, MD,** joined Dayton Children's Urgent Care - Springboro.

EMERGENCY DEPARTMENT RENOVATION

Increasing needs of the community have resulted in growing emergency volumes and much-needed renovations are currently underway to expand the Soin Pediatric Trauma and Emergency Center. The new space will improve patient care, reduce wait times and create a better overall experience for patients and families. Renovations are expected to be complete by spring 2011.

letter gives more convenient, direct access to topics of interest and timely news from Dayton Children's many expert services, CME programs and more. Remember to include your e-mail address on the post-test and evaluation form to be registered for *Pediatric Link*.

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To request additional copies of these tools, or for more information on getting signed up for *KidsCare Link*, call marketing communications at 937-641-3618 or ask your physician liaison, Ruthie Laux or Kim Grant.

PROGRAM EVALUATION

PEDIATRIC FORUM,
VOLUME 22,
NUMBER 1

1. Did the material presented in this publication meet the mission to enhance health care delivery in our region through education based on the essentials and policies of the Accreditation Council for Continuing Medical Education? (Circle one response.)

Strongly agree Agree Neutral Disagree Strongly disagree

2. Did the material presented in this publication meet the educational objectives stated?

_____ Met the stated objectives

_____ Did not meet the stated objectives

3. Please rate the contents of this issue using the following scale:

1 = Poor, 2 = Fair, 3 = Good, 4 = Very good, 5 = Excellent

(Circle one response for each.)

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

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

5. Are there any other topics you would like to have addressed in this publication or future educational programs for health care providers?

_____ Yes

_____ No

If yes, please describe: _____

6. Letter to the editor (may be published in next issue) _____

Physician accreditation statement and credit designation

Wright State University (WSU) Boonshoft School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. WSU Boonshoft School of Medicine designates this educational activity for a maximum of 2.0 AMA PRA Category 1 Credit(s)TM. Physicians should only claim credit commensurate with the extent of their participation in the activity.

ANSWER SHEET

PEDIATRIC FORUM,
VOLUME 22,
NUMBER 1

Instructions

To obtain CME credit you must:

- Read and reflect on each article.
- Answer the questions from each article and complete this answer sheet.
- Complete the program evaluation located on reverse side.
- Return your completed answer sheet and program evaluation by mail or

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Department of Continuing Medical Education
The Children's Medical Center of Dayton
One Children's Plaza Dayton, OH 45404-1815
Fax: 937-641-5931

The answer sheet and program evaluation must be received by
January 31, 2011 for the credit to be awarded.

Upon completion of all requirements, Wright State University will issue a memorandum of credit to you for your permanent records.

Answers (Please circle the BEST answer.)

1. True False
2. True False
3. True False
4. True False
5. True False
6. True False
7. True False
8. a b c d e
9. True False
10. True False
11. True False
12. True False
13. a b c d
14. True False

Physician accreditation statement and credit designation

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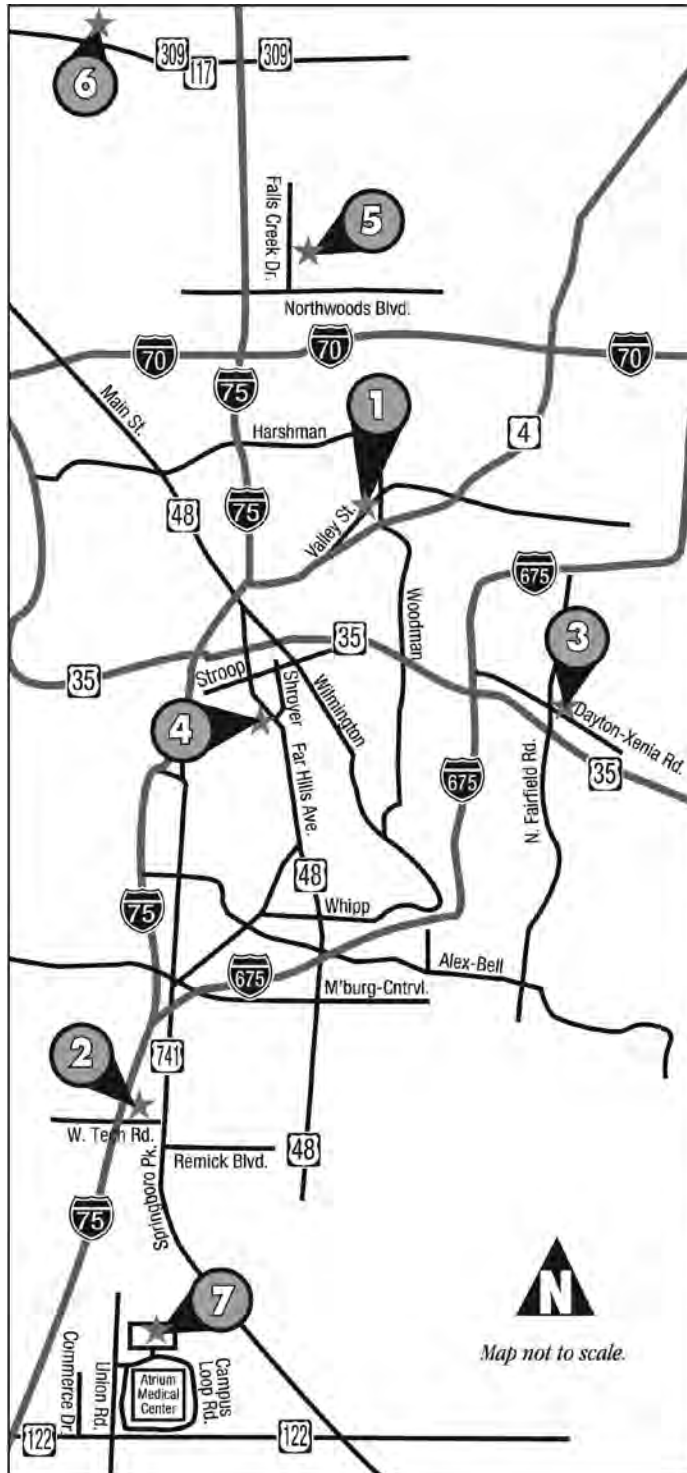
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3224 Dayton-Xenia Road, Suite 100...937-641-5770

- 4** **Kettering —** The Arbor Shopping Center
4475 Far Hills Avenue937-641-5760

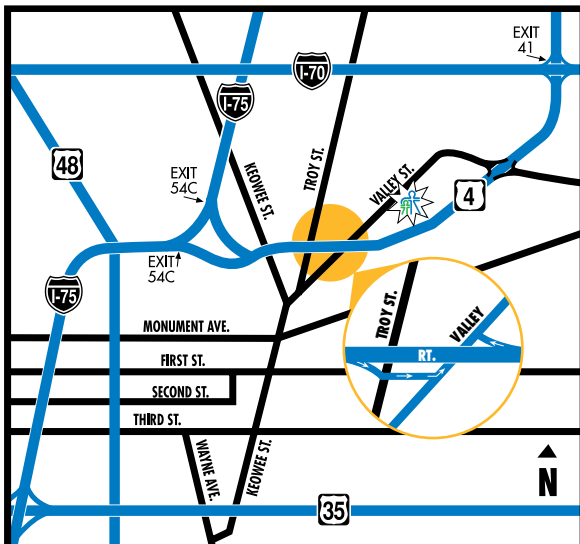
- 5** **Vandalia —** Off Northwoods Boulevard
810 Falls Creek Drive, Suite A937-641-5765

Specialty Centers

- 6** **Lima - St. Rita's Med Care Clinic**
939 West Market Street
Hours: Vary by clinic
Specialty clinic visits with physician referral
Ask operator for specific clinic937-641-3000

- 7** **Specialty Care Center — Warren County**
100 Campus Loop Road, Suite A
Conveniently located near the new Atrium Medical Center, on the Premier Health Campus — Middletown
Hours: Mon-Fri 8:30 am to 5:30 pm
Sat 8:30 am to 12:30 pm
Specialty clinic visits, lab and medical imaging (x-ray, etc.) with physician referral513-424-2850

Please deliver to current resident



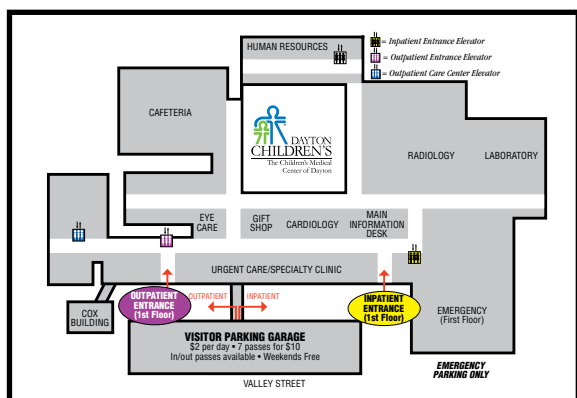
Street Directions

From the North: I-75 south to Exit 56, Stanley Avenue. At the bottom of the exit, turn LEFT and follow Stanley Avenue east about 1 mile. Just before SR 4 (you will see it in front of you), turn RIGHT on Valley Street. Follow Valley Street about one-half mile. Dayton Children's is on the left.

From the East: Rt. 35 west to the Keowee St. exit; right on Keowee St. to Valley St.; right on Valley St. From I-70 Exit 41, take Rt. 4 south to Stanley Ave./ Findlay St. exit. Turn right at bottom of exit, then left at the first light on Stanley Ave. This is Valley St.

From the West: Third St. east to Keowee St.; left on Keowee St. to Valley St.; right on Valley St.

From the South: I-75 north to the Stanley Avenue exit. Turn right on Stanley Ave. Follow Stanley Ave. until Valley Street. Turn right on Valley Street. Or I-675 north, Exit 13 to Rt. 35; west on Rt. 35 to the Keowee St. exit; right on Keowee to Valley St.; right on Valley St.



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