Complications from cochlear implantation occur in approximately 10% of patients. They are more often seen on a delayed basis and highlight the need for long-term medical follow-up.

**Objective:** To evaluate the frequency of, and risk factors for, complications following cochlear implant surgery.

**Design/Participants:** This was a retrospective study from Paris of 434 patients from 1 month to 16 years of age (mean, 4.7 years).

**Methods:** Approximately 9% of the children had a cochlear implantation done when they were <24 months; 10% had inner ear malformations. The mean follow-up for the entire cohort was 5.5 years. Complications were classified as early (occurring from 0 to 8 days postoperatively) or delayed (occurring >8 days following the surgery). These were further classified as minor or major complications, with major complications defined as any need for additional surgery or any ear-related medical condition that warranted a new admission or an unanticipated extended hospital stay.

**Results:** 10% of patients (43/434) experienced complications. Delayed complications were more common than early complications, occurring in nearly two-thirds of the patients with a mean delay of just over 2 years (2.2 years, but with a range up to >8 years). Slightly >50% of those with complications had major complications, which included severe cutaneous infections, meningitis, cholesteatoma, cerebrospinal fluid leak, and electrode misplacement. Slightly <50% with complications had minor complications, with vertigo in approximately two-thirds of these patients. Other minor complications included less severe soft-tissue infections, persistent otitis media, and facial palsy. In about one-third of all patients with complications (or about 3% of all those who underwent a cochlear implant), a reimplantation was needed. Patients with underlying inner ear malformations and those who experienced mastoid trauma were most susceptible to problems. The age of the patient at the time of surgery did not impact the likelihood of a complication, either minor or major.

**Conclusions:** After a cochlear implant, complications are common, particularly if trauma to the mastoid area occurs. Inner ear malformations are also a risk factor for a higher likelihood of a future problem. However, young children with implantation did not appear to have increased risk.

**Reviewer's Comments:** With any surgery, success and complication rates are also felt to be potentially influenced by both the operator and the type of operation. In this paper, all surgeries were done by 3 senior surgeons who note that the surgical techniques themselves underwent very few changes during the study period. The primary procedures were mastoidectomy and posterior tympanotomy allowing access to the inner ear. The approach to the area of the cochlea was uniform throughout the study period. Changes that did occur over time included systematic monitoring of the facial nerve and antibiotic prophylaxis with ceftriaxone for 3 days postoperatively. In this paper, 1 out of 10 patients experienced a complication, often major, and they often occurred on a delayed basis. This highlights the need for long-term medical follow-up. (Reviewer-Mark F. Ditmar, MD.)

© 2010, Oakstone Medical Publishing

Keywords: Cochlear Implant, Medical/Surgical Complications

Print Tag: Refer to original journal article
Children with cochlear implants and their parents have similar QOL experiences when compared to NH children.

**Background:** Deaf children struggle with quality-of-life (QOL) issues including increased social and emotional challenges. Some studies have suggested emotional adjustment disorders are 3 to 6 times greater in these children than in their normal-hearing (NH) peers.

**Objective:** To assess the QOL of children with cochlear implants as compared to NH children.

**Participants/Methods:** Children with cochlear implants (representing 16 different states) who had attended 2 summer camps in Texas and Colorado were recruited in 2007 and 2008. The inclusion criteria included having a cochlear implant and profound hearing loss. Two age groups were studied, those from 8 to 11 years of age and those from 12 to 16 years of age. The children and parents were independently assessed and scored. Children’s scores were compared to those of NH children. The questionnaire used to evaluate QOL was the Kid-KINDL-R for the 8- to 11-year-old group and the Kiddo KINDL-R for the 12- to 16-year-old group. Questions dealt with physical well-being, psychological well-being, self-esteem, family, friends, and school.

**Results:** The average age of the younger group was 9 years; the mean onset of deafness was 13 months, and implantation occurred at 3 years, 3 months. Children in this group rated their QOL slightly less positively than their NH peers, while the children and their parents had similar scores across all subscales. The emotional and self-esteem subscales had a relationship with the onset of deafness and length of cochlear implant use. Children who were older at the onset of deafness tended to have more positive scores in the emotional and self-esteem QOL life areas compared to younger children. In the older group, the mean age of participants was 13 years, with hearing loss diagnosed at a mean of 1 year of age, and cochlear implantation occurring at a mean age of 5 years. This group had similar QOL scores. There were some lower scores in the friends and school subsets than in the NH comparison group. Parents rated their children’s success at school higher than the children did. Adolescents who had cochlear implantations at an earlier age had higher overall QOL scores than children who underwent cochlear implantation at an older age. When comparing the 2 groups, the younger group who had cochlear implantation had higher QOL scores compared to the older group with cochlear implants.

**Conclusions:** Children with cochlear implants and their parents have similar QOL experiences when compared to NH children.

**Reviewer's Comments:** Cochlear implants have the amazing ability to transform children from deafness to hearing. The affects show a positive effect on multiple areas of a child's life. Based on old studies, deaf children struggle in school and have difficulty making friends. In this study, there were minimal differences in the cochlear implant group compared to NH children. The parent’s impression of their child's QOL correlated well with their children’s own impressions about their QOL. (Reviewer-Charles I. Schwartz, MD).

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Keywords: Deafness, Cochlear Implants, Quality of Life

Print Tag: Refer to original journal article
Chronic Childhood Illness Leads to Burnout Syndrome in Parents

*Increased Prevalence of Burnout Symptoms in Parents of Chronically Ill Children.*

Lindström C, Åman J, Norberg AL:

Acta Paediatrica 2010; 99 (March): 427-432

There is a high level of emotional exhaustion, physical weakness, and cognitive symptoms in parents of children with chronic illnesses such as T1DM and IBD.

**Background:** The diagnosis of chronic illness in a child may initially have a profound impact on the physical and emotional health of parents, but there is limited understanding of the effect that this stress has over time. Some studies suggest that protracted burdens of a child's illness lead to symptoms of burnout, such as listlessness and fatigue, whereas other studies show that the stressful effects decrease over time.

**Objective:** To examine the prevalence of burnout symptoms in parents of children with chronic disease.

**Methods:** Parents of children with either Type I Diabetes Mellitus (T1DM) or inflammatory bowel disease (IBD) were recruited through the clinics of a university hospital in Sweden. The age range of children was 1 to 18 years, and all had been diagnosed at least 6 months prior to data collection. Parents of healthy children served as controls. All parents received separate questionnaires measuring burnout symptoms, including emotional exhaustion, physical fatigue, listlessness, tension, and cognitive difficulties. Additional surveys included items to evaluate memory, somatic complaints, and sleep disturbances.

**Results:** 252 parents of children with T1DM, 38 parents of children with IBD, and 124 controls completed the study. The average age of children with T1DM was 7.5 years, and the average duration of illness was 5.4 years. Most were treated with insulin injections, fewer with an insulin pump, and all conducted frequent glucose checks. The average age of the IBD children was 9.9 years, and their average duration of illness was 4.6 years. Treatment involved the use of steroids or other anti-inflammatory drugs and enteral or parenteral nutrition. In the total study group, 36% of parents of children with chronic disease scored in the range for clinical burnout compared to 20% of the reference parents. Symptoms of burnout were more prominent in mothers (approximately 43%) than in fathers (20%) of chronically ill children. Levels of all burnout symptoms were significantly higher for mothers of children with T1DM than in controls, while fathers of children with T1DM and mothers and fathers of children with IBD had higher levels of burnout symptoms in many categories.

**Conclusions:** Parents of chronically ill children have a significantly higher level of burnout symptoms than those of healthy controls, even years after the child's initial diagnosis.

**Reviewer's Comments:** Although T1DM and IBD are both chronic illnesses, the features of each are quite different. The high level of burnout in both cases suggests that similar stress factors, rather than the specific demands of the condition, contribute to parental burnout. The emotional exhaustion, physical fatigue, and cognitive symptoms that define the burnout syndrome may ultimately affect a parent's ability to manage the child's condition and may influence the child's emotional and physical outcomes. As part of routine follow-up for these children, assessment of parental status and availability of psychosocial support is clearly necessary. (Reviewer-Alyssa Siegel, MD).

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Keywords: Chronic Illness, Burnout, Family Stress, Inflammatory Bowel Disease, Diabetes Mellitus

Print Tag: Refer to original journal article
Characteristics of Premature Thelarch Not Predictive of Precocious Puberty

Premature Thelarche: Age at Presentation Affects Clinical Course but Not Clinical Characteristics or Risk to Progress to Precocious Puberty.

de Vries L, Guz-Mark A, et al:

J Pediatr 2010; 156 (March): 466-471

Clinical characteristics at time of presentation of premature thelarche are not predictive of progression to precocious puberty.

Background: Premature thelarche (PT), or isolated breast development in girls <8 years of age, is the most common of all premature puberty disorders in girls. It is most often seen in the first year of life, with decreasing frequency until age 5, when there is a slight increase in incidence.

Objective: To investigate what percentage of girls with PT will go on to have precocious puberty (PP) and if specific characteristics are predictive of progression to PP.

Design: Retrospective chart review.

Methods: The authors conducted a retrospective chart review of girls followed in a pediatric endocrinology clinic for PT between 1995 and 2005. Girls who developed PP within 1 year of presentation, had estrogen-producing tumors or persistent elevation of blood estradiol levels, or were exposed to external estrogens were excluded. Patients were divided into 3 groups based on age at presentation: birth, infancy (1 to 24 months), and childhood (2 to 8 years). Charts were reviewed for clinical history, family history of PP, maternal age at menarche, exposure to estrogen-containing products and soy products, physical examination, Tanner pubertal stage, bone age assessment, and hormonal levels.

Results: Chart reviews were completed for 124 girls; 52 had onset at birth, 53 during infancy, and 19 during childhood. There was no difference in birth weight or mean gestational age among the 3 groups. Twelve had low birth weight (<2500 g), 12 were born prematurely, and 8 had exposure to soy products. PT was bilateral in 75% and unilateral in 25%. All of the cases were staged as Tanner stage 2 or 3. Basal luteinizing hormone levels were undetectable in all girls tested. Basal and gonadotropin-releasing hormone (GnRH)-stimulated follicle-stimulating hormone levels were significantly higher in those with onset at <2 years of age. Patients were followed for a mean of 6.5 years; 50.8% had regression of PT, 36.3% had persistence, 3.2% had progression, and 9.7% had a cyclic pattern. The mean time for regression was 16.5 months. A progressive or cyclic course was more prevalent among those whose onset was after 2 years of age. Thirteen percent progressed to central early or precocious puberty; their clinical characteristics were statistically indistinguishable from those who had normal onset of puberty.

Conclusions: Clinical characteristics at presentation of PT are not predictive of progression to PP.

Reviewer's Comments: Thirteen percent seems like a high proportion to progress to early or precocious puberty. However, this was a referral population, so results may not be generalizable. In addition, it is important to separate true thelarche from excess fat tissue in the breast area. (Reviewer-Rachel Moon, MD).

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Keywords: Precocious Puberty, Premature Thelarche

Print Tag: Refer to original journal article
Lifestyle, Nutritional Changes Lessen Migraine Frequency in Young Children

Effectiveness of Nonpharmacologic Treatment for Migraine in Young Children.
Eidlitz-Markus T, Haimi-Cohen Y, et al:

Headache 2010; 50 (February): 219-223

Approximately 75% of patients <6 years of age and 25% of those >6 years of age have substantial improvement in migraine headache frequency after modifying sleep practices and diet and limiting sun exposure.

Objective: To evaluate nonpharmacologic therapies for patients <6 years of age with migraine headaches.

Participants: In this study from Israel, patients from 4 years to 17 years of age who were referred to a headache clinic in a tertiary center from 2004 to 2008 were included.

Methods: Instructions were provided in the following areas: (1) maintenance of regular sleep hours, with regular bedtimes and waking times and sufficient sleep time based on age; (2) a diet that refrained from food additives; and (3) no direct sun exposure, with appropriate head coverage, especially in the summer. Avoidance of sunlight was recommended to limit dehydration-induced headaches. Adherence to these regimens was based on frequent interviews with the patients and parents who kept a daily headache calendar. Response to treatment was on a 3-point scale: grade 1, no change; grade 2, at least a 50% reduction; or grade 3, at least a 75% reduction in headache frequency with or without a decrease in intensity. Patients were divided into those <6 years of age and those >6 years of age; 92 children were included in the study. Approximately 33% were <6 years old. Prior to initiating treatment, the younger group was characterized with a significantly lower frequency of migraines and a shorter duration of the problem than the older children.

Results: In the younger group, 73% had a response in the grade 2 or 3 categories, indicating a very substantial benefit of 50% to 75% or more. However, in the group >6 years of age, the beneficial response was significantly less at 27%.

Conclusions: As a primary option for migraine, conservative therapy appears to be more effective in children <6 years of age compared to older children.

Reviewer's Comments: There are issues with this study in terms of the reliable documentation of adherence to the regimens. And certainly, the concept of maximum sleep, no chocolate or pizza, and no sunlight will not be warmly received (or followed) by teenage migraine sufferers in your practice. However, while 73% of older children did not have a great response, nearly 1 in 4 did. There is some potential downside to the recommendations. Sunlight is necessary for vitamin D generation. It is suspected that sunlight exposure itself is not the problem, but dehydration-induced headaches are. A compromise might be to recommend increased fluid intake, especially during warmer weather. Certainly, the use of a nonpharmacologic approach in younger patients on an initial basis has a lot of appeal. Approximately 3% of childhood migraines are felt to begin before age 6 with the number rising to 4% to 11% by ages 7 to 11 years. (Reviewer-Mark F. Ditmar, MD).

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Keywords: Migraine Headache, Pediatrics, Nonpharmacologic Treatment

Print Tag: Refer to original journal article
Obesity Strongly Associated With Abnormal Lipid Levels


May AL, Kuklina EV, et al:

MMWR 2010; 59 (January 22): 29-33

Forty-three percent of obese U.S. adolescents and 22% who are overweight have abnormal lipid profiles and might benefit from interventions to reduce the risk of future cardiovascular disease.

Objective: To determine the prevalence of abnormal lipid levels in adolescents from 12 to 19 years of age in the U.S. and eligibility for lipid screening based on body mass index (BMI) criteria.

Participants/Methods: Data were obtained from the National Health and Nutrition Examination Survey (NHANES), which is a continuous survey of approximately 6,000 people of various ages felt to represent a cross-section of the U.S. population. Participants undergo a detailed interview and physical examination, including height and weight information. A subset of the group is randomly selected and asked to fast for 8 to 24 hours before lipid profile tests are done. This current report is a combined sample from 4 surveys that encompasses 3.125 adolescents ages 12 to 19 years who provided blood samples for testing. Serum levels for low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides were obtained. Abnormal cut-off points (in mg/dL) were defined for high LDL as ≥130, low HDL as ≤35, and high triglycerides as ≥150.

Results: Among all adolescents, 20% had at least 1 lipid abnormality. Fifteen percent were overweight and 17% were obese; thus, 32% had an abnormal BMI. Overweight (BMI, 85th to 94th percentile) and obese (BMI, ≥95th percentile) youths were 1.6 and 3 times, respectively, more likely to have a lipid abnormality compared to youths of normal weight. Forty-three percent of participants who were obese had at least 1 lipid abnormality.

Conclusions: Based solely on weight, about 1 in 3 adolescents would be candidates for lipid screening if American Academy of Pediatrics (AAP) recommendations were followed. One in 5 youths who are overweight and nearly 1 in 2 who are obese had abnormal lipid levels and would be candidates for therapeutic lifestyle counseling.

Reviewer's Comments: There is debate whether lipid screening should be universal rather than solely for selected high-risk groups. Also, in an ideal world, universal therapeutic counseling would be given to all adolescents who, let's continue the fantasy, would absorb the information and modify problematic behaviors. For now, most major advisory groups, including the AAP and the U.S. Preventive Services Task Force of the U.S. Department of Health and Human Services, recommend against routine screening for all. However, both groups do advise routine lipid screening for children and adolescents who are overweight and obese. This study provides additional ammunition for that advisory. Approximately 1 in 3 adolescents were found to be heavier than average, and an increased BMI was clearly is associated with a higher likelihood of having an abnormal lipid profile. (Reviewer-Mark F. Ditmar, MD).

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Keywords: Abnormal Lipid Profile, BMI, Lipid Screening

Print Tag: Refer to original journal article
In this study, vitamin D insufficiency is seen in 59% of African-American children with forearm fractures.

**Background:** Approximately 50% of all children will experience a bone fracture at some point, and many of these will have >1 broken bone during childhood. Several studies have suggested that poor bone health may be a contributing factor to pediatric fractures. Poor bone health can result from poor nutrition, limited physical activity, and genetics. African Americans may be at higher risk for poor bone health because they are more likely to have vitamin D deficiency from low dietary intake, a higher prevalence of lactose intolerance, and darker skin pigmentation.

**Objective:** To determine the prevalence of vitamin D insufficiency and abnormal bone mineral density in a cohort of African-American children with forearm fractures.

**Design:** Prospective cohort study.

**Methods:** The authors enrolled a convenience sample of African-American children, aged 5 to 9 years, with an isolated fracture of the radius and/or ulna demonstrated on x-ray. Children with a prior history of bone disease, such as osteogenesis imperfecta, or those with a history of using antiepileptic medications were excluded. Patients had a bone health evaluation, including measurement of serum 25-hydroxy vitamin D levels and bone mineral density by dual energy x-ray absorptiometry scan.

**Results:** 17 patients were enrolled in the study. The mean age was 7.3 years, and 53% were males. The mean 25-hydroxy vitamin D level was 20.1 ng/mL (range, 10 to 38 ng/mL). Values of <20 ng/mL are considered insufficient. Ten children (59%) had insufficient serum levels of vitamin D. All patients had normal bone mineral density, and no patients had x-ray evidence of osteopenia.

**Conclusions:** The authors conclude that vitamin D insufficiency may play a role in childhood fractures, and they suggest that it may be prudent to obtain routine vitamin D levels in African-American children who experience fractures.

**Reviewer's Comments:** Before you start filling out the laboratory slips, however, remember that this is a very small study with only 17 patients. Although there was a high prevalence of vitamin D insufficiency, none of the patients had decreased bone mineral density. The authors do not provide a possible explanation for how vitamin D insufficiency might increase the risk of fracture in patients with normal bone mineral density. So I would wait until there is more definitive data before routinely checking vitamin D levels in these patients.

(Reviewer-Rachel Moon, MD)

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Keywords: Fracture, Vitamin D Insufficiency, African Americans

Print Tag: Refer to original journal article
Chest X-ray May Reveal CA Calcification, Stenosis in Former KD Patients

Follow-Up Chest X-Ray in Patients With Kawasaki Disease: The Significance and Clinical Application of Coronary Artery Macro-Calcification.

Lapiere C, Bitsch A, et al:

Pediatr Cardiol 2010; 31 (January): 56-61

KD patients with persistent CA aneurysms are at high risk for obstructive CA calcifications and stenosis, which can be detected by both fluoroscopy and chest x-ray.

**Background:** While 50% of Kawasaki-related coronary aneurysms regress, there is significant risk for coronary artery (CA) stenosis in cases of persistent aneurysms, and this may be preceded by significant scarring by calcium deposition. Radiographic studies looking for the features and incidence rates of CA calcification have been limited.

**Objective:** To correlate CA calcification with angiographic abnormalities and to determine the detection rate of CA calcification by chest x-ray.

**Design:** Retrospective cohort study.

**Participants:** 50 participants who previously had Kawasaki disease (KD) and subsequent coronary angiogram due to either persistent coronary lesions or chest pain symptoms.

**Methods:** The medical records of all 50 participants were retrospectively reviewed for angiography, chest fluoroscopy, and chest x-ray. Two experienced radiologists then reviewed each angiogram for aneurysm and obstructions and each fluoroscopy study for CA calcification. Two radiologists blinded to these study results, then reviewed each chest x-ray in those participants with abnormal angiograms to look for calcifications.

**Results:** 18 participants had abnormal angiogram results. Ten had a persistent CA aneurysm, while 8 had an obstructive lesion. Fluoroscopy noted CA calcification in 1 participant who had no obstructive lesion found by angiography and in all participants with a positive angiogram for an obstruction. Moreover, obstruction was simultaneous with CA calcification in all but 1 case. All calcifications found by fluoroscopy were noted on chest x-ray by both radiologists who reviewed the films. All participants with significant findings denied cardiac symptoms, and all but 1 had a normal electrocardiogram (EKG) and echocardiogram.

**Conclusions:** Both fluoroscopy and chest x-ray identified CA calcification in all participants found to have an obstructive lesion by angiography. Almost all participants with stenosis lacked symptoms and had a normal EKG and echocardiogram. The investigators suggest that yearly chest x-rays in KD patients with persistent CA aneurysms may be indicated.

**Reviewer’s Comments:** While the management of CA aneurysms and calcifications secondary to DK is not typically in the purview of the general pediatrician, I believe it is still important to know what surveillance may be warranted in order to best advocate for these patients. Of note, the investigators caution that a normal chest x-ray, despite clinical concern, does not remove the need to do further investigation by angiography.

(Reviewer-Lisa Humphrey, MD).

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Keywords: Kawasaki Disease, Coronary Artery Macro-Calcification, Chest X-Ray

Print Tag: Refer to original journal article
Most children who are older tend to be given a lower than recommended dose of amoxicillin for AOM.

**Objective:** To study prescribing behaviors for the treatment of acute otitis media (AOM) with amoxicillin and to assess the opinion from the committee members of the Subcommittee on Management of Acute Otitis Media of the American Academy of Pediatrics (AAP) who recommended the high-dose amoxicillin.  

**Methods:** This study had 2 parts. This first part was a retrospective review of children who were diagnosed with otitis media and treated with amoxicillin. These children were either seen in the emergency department or clinic at the local health system. Medical records were also evaluated to see if the patient returned 4 weeks after the diagnosis was made. Charts that were selected were divided into 2 groups. Group 1 included children who weighed <20 kilograms and group 2 were those who weighed ≥20 kilograms. In Group 2, if given the recommended dose of 80 to 90 mg/kg per day, the child would exceed the recommended maximum dosing for adults. The second part of the study included interviews with the subcommittee on management of AOM from the AAP. 

**Results:** The final cohort consisted of 359 patients. In group 1, the daily dose was higher than the recommended dose. In group 2, 36% of the children were prescribed the standard adult dose at 1.5 g/day, 54% were prescribed less than the adult dose, and 9% were prescribed above the adult dose for amoxicillin. There was no correlation between physician specialty and the dose strength. In part 2 of the study, 9 of the 14 members who served on the committee responded to a questionnaire. One member was aware of the effect the increase in obesity had on antibiotic prescribing, 7 were not aware, and 1 was aware but did not recall if it was discussed. Only 2 committee members remembered discussing what to do when estimated dose exceeded 1.5 grams. Regarding the final question for the members of if given the situation where the 80 to 90 milligram per dosage was above 1.5 grams per day, what dose they would prescribe, 6 of the 9 would prescribe the 1.5-gram dose and 3 would prescribe the recommended 80 to 90 mg/kg per day. 

**Conclusions:** Most children who are older tend to be given a lower than recommended dose of amoxicillin for AOM, but a significant number who follow the 80- to 90-mg/kg recommendations will exceed the adult dosage. 

**Reviewer's Comments:** Since there are no absolute maximum doses for children, many physicians would assume that he adult dose should be the target. However, based on the groups studied and the committee member who recommended the high-dose strength, there is still room for interpretation on what is the maximum dose. It seems unnecessary to give more than adults would receive for the treatment of AOM in a child. (Reviewer-Charles I. Schwartz, MD).
Multiple species of *Clostridium*, not including *C. botulinum*, are found in powdered infant formula and may indicate the potential for coexistence of neurotoxigenic strains.

**Background:** There are >20 protein toxins elaborated by various species of *Clostridium* bacteria conferring medical significance to the presence of Clostridia in food sources. While honey is a known source of *Clostridium botulinum* spores and the most documented source of infant botulism, a recent case in the U.K. has raised concern about the possibility of similar spores in commercial powdered infant formula.

**Objective:** To investigate the presence of Clostridial spores in powdered infant formulas manufactured in the United States.

**Methods:** All children in California with a diagnosis of infant botulism were identified by the Infant Botulism Treatment and Prevention Program, a special division of the California Department of Public Health. Parents who reported using powdered infant formula within 4 weeks preceding the onset of illness submitted the unused portion in its original container. Samples of formula were anaerobically cultured for spore-forming bacteria, with care taken to avoid laboratory contamination. Those with positive growth in culture were subcultured for species isolation/identification, and were further screened for the presence of botulinum neurotoxin.

**Results:** 30 powdered infant formulas associated with 19 laboratory-confirmed cases of infant botulism were submitted, and an additional 9 samples were market purchased. Twenty of the case-associated samples were of the same brand. Thirty-one percent of the formula samples contained Clostridial spores. Though 12 species were identified, *Clostridium sporogenes*, a species closely related to *C. botulinum*, was the most common (in 67%). Botulinum neurotoxin, which distinguishes the 2 species, was not found. **Conclusion:** *C. sporogenes*, a bacterium with similar distribution in soil and dust as *C. botulinum*, has been identified in powdered infant formulas and may serve as a marker for coexisting neurotoxigenic spores in these products.

**Reviewer’s Comments:** It is well accepted that powdered infant formula is not a sterile product, and the Food and Drug Administration has declared that it is not feasible to set microbiologic standards (with few exceptions). This study was prompted by a single case report of infant botulism in the U.K. that presumably resulted from contaminated powdered infant formula. The present study found multiple Clostridial species in the formula samples, with a focus on *C. sporogenes*, a physiologic and genetically similar strain to *C. botulinum* with an important exception—it does not produce a neurotoxin. Considering that *C. botulinum* was not identified and that there has not been a rise in cases of infant botulism in the U.S., we should be reassured that the presence of Clostridial spores does not seem to represent a public health threat. The concern lies only with the potential for the coexistence of *C. botulinum* with the Clostridial species found here and the risk of infant botulism that such a situation would confer. (Reviewer-Alyssa Siegel, MD).

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Keywords: Infant Botulism, Botulinum Toxin, *Clostridium*

Print Tag: Refer to original journal article
Urine Dipsticks Perform Well in Children ≥2 Years Old

*Diagnostic Performance of Urine Dipstick Testing in Children With Suspected UTI: A Systematic Review of Relationship With Age and Comparison With Microscopy.*

Mori R, Yonemoto N, et al:

Acta Paediatr 2010; January 5 (): epub ahead of print

Urine microscopy performs better than dipstick as a screening test for UTIs in children <1 year old.

**Background:** While urine culture is the gold standard for diagnosing urinary tract infections (UTIs), making a preliminary diagnosis before the urine culture returns is important for guiding early treatment. Whether dipstick or microscopy is the best tool to make that preliminary diagnosis for younger or older children is unclear.

**Objective:** To evaluate the effect of age on the accuracy of dipsticks and urine microscopy to predict UTIs.

**Methods:** The authors performed a meta-analysis of the existing literature. They conducted a systematic search of various databases including Medline, Embase, Cochrane Registry of Controlled Trials, and Cochrane Database of Systematic Reviews. Two authors selected articles that compared urine dipstick to microscopy for diagnosis of UTIs. Articles that studied children with known urological or immunological abnormalities or neonates in the intensive care unit were excluded. The quality of studies was evaluated using a tool developed by NICE (UK National Institute for Health and Clinical Excellence) to review the hierarchy of evidence for diagnostic tools. The authors used a bivariate random-effects model to estimate summary measures and their 95% confidence intervals. They calculated positive and negative likelihood ratios (LR) for both tests and conducted a sub-group analysis for older and younger children.

**Results:** There were 6 studies that met criteria, but only 1 study compared dipstick performance with microscopy across age groups. For predicting UTI in children <1 year old, microscopy using 10 white blood cell (WBC) per high power field (hpf) as a cutoff outperformed dipstick (LR+: 15.6 vs 6.24; 95% CI, 4.16 to 58.44 vs 1.14 to 34.22). For predicting UTI in children ≥2 years old, dipstick outperformed microscopy regardless of whether a 5 or 10 WBC per hpf cutoff was used. For ruling out UTI in children <1 year old, dipstick had a similar point estimate (but wider confidence interval) compared to microscopy, with a cutoff of 5 WBC counts per hpf (LR−: 0.27 vs 0.31; 95% CI, 0.07 to 0.99 vs 0.13 to 0.71). For ruling out UTI in children ≥2 years old, microscopy outperformed dipstick when a 5 WBC cutoff per hpf was used (LR−: 0.04 vs 0.17; 95% CI, 0.00 to 0.59 vs 0.07 to 0.41).

**Conclusions:** In general, microscopy is more accurate for making a preliminary diagnosis of UTI in a young child.

**Reviewer's Comments:** While this study raises an interesting question, its practical relevance depends upon your practice setting. Most primary care physicians don't do a microscopy on urine in their office and so, by necessity, the dipstick is their screening test of choice. Although not better than microscopy in younger children, its performance is still reasonable. Given that (a) this is one study and (b) the study used a gold standard of colony count, which means children with asymptomatic bacteriuria (and hence not true UTI) are included in the study, I would not recommend that doctors go out and buy a microscope just yet. (Reviewer: Beth A. Tarini, MD).

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Keywords: UTIs, Urine Dipstick/Microscopy, Test Performance

Print Tag: Refer to original journal article
In a study of adults comparing antibiotic durations and long-term outcomes for Lyme disease, those treated ≤10 days had similar outcomes compared to those treated ≥16 days; treatment failures in both groups were exceedingly rare.

**Background:** The American Academy of Pediatrics (AAP) Red Book recommends antibiotic treatment for Lyme disease for 14 to 21 days.

**Objective:** To determine clinical outcomes of patients with Lyme disease based on the duration of antibiotic therapy prescribed.

**Design/Participants:** This is a retrospective cohort study and follow-up survey of patients seen in Wisconsin, where there is a high rate of Lyme disease, during a 4-year period from 2000 to 2004.

**Methods:** 607 patients were included in the study, all of whom were adults (ie, ≥18 years of age) and had evidence of erythema migrans (EM) or systemic illness with laboratory confirmation of Lyme disease. The former were considered definite cases and the later were considered probable cases. Early disseminated disease was defined as multiple EM lesions, carditis, acute aseptic meningitis, or seventh nerve paralysis. Patients in this cohort were treated with doxycycline or amoxicillin for varying treatment durations ranging from ≤10 days (17%), 11 to 15 days (33%), or ≥16 days (47%). Treatment failure was the primary outcome, and this was defined as persistent EM or progressive Lyme disease syndromes.

**Results:** 6 of the 607 patients were felt to be treatment failures, of whom 4 had a clinical course compatible with reinfection; 1 was treated with an inappropriate antibiotic and 1 developed facial paralysis early in the course of treatment. Treatment failure rates were very low, estimated to be ≤1% in all antibiotic duration groups. Two years after treatment, there was no difference in the failure rate for those treated for Lyme disease ≤10 days with antibiotics compared to those treated 11 to 15 days or more.

**Conclusions:** Treatment for Lyme disease in adults with ≤10 days of antibiotic therapy resulted in similar long-term outcomes compared to those treated with longer courses. Treatment failure after short-course therapy appears to be exceedingly rare.

**Reviewer's Comments:** The authors feel this study provides strong evidence that persistent active infection with Lyme disease after a 10-day course of therapy (or perhaps even less) is exceedingly rare. They have an ally in Dr. Raymond Dattwyler of New York Medical College in Valhalla who provided the editorial commentary. He states that early Lyme disease, both local and acute disseminated, can and should be treated for 10 days (not 14 to 21) with an appropriate antibiotic, either doxycycline or amoxicillin. Will major infectious disease organizations, such as the Infectious Disease Society of America or the Committee of Infectious Diseases of the AAP, follow suit with modifications of their formal recommendations? Stay tuned on that front. Certainly, it would be a bonus for purposes of adherence if the treatment duration becomes shorter for children. For now, however, the 2- to 3-week rule still applies. (Reviewer-Mark F. Ditmar, MD).

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**Keywords:** Lyme Disease, Treatment, Antibiotics, Outcomes

**Print Tag:** Refer to original journal article
For infants with enterovirus CSF infections, a lack of pleocytosis is associated with younger age and lower peripheral WBC count.

**Background:** Non-polio enterovirus causes millions of symptomatic infections in the U.S. every year, mostly in the summer and fall, and often in infants <3 months of age. Because of this, even though most cases are benign and self-limited, infants are often hospitalized and receive a number of tests. Previous work has shown that up to 65% of hospitalizations for infants <3 months of age for suspected serious bacterial infections during enteroviral season are caused by enterovirus. Some have recommended the use of polymerase chain reaction (PCR) testing for enterovirus as a means to reduce hospital length of stay, antibiotic use, and testing.

**Objective:** To determine if factors are associated with cerebrospinal fluid (CSF) pleocytosis in infants <3 months of age who have enterovirus infections of the central nervous system (CNS).

**Design/Participants:** This was a retrospective study of patients cared for at a tertiary care children's hospital.

**Methods:** Eligible patients were those <3 months of age who were evaluated between 2000 and 2006 and had CSF enterovirus PCR performed within 48 hours of hospitalization with a positive result. Those who received antibiotics were still included as this was thought not to influence results. Those who had other infections that could influence pleocytosis were excluded. Analyses were conducted in order to determine if factors were associated with CSF pleocytosis.

**Results:** Over the course of the study, 159 patients had positive results for enterovirus; 5 had serious bacterial infections and were excluded from further results. The median CSF white blood cell (WBC) count for those with enterovirus infections was 110/µL. Pleocytosis was present in a majority of cases (71%). The percentage of infants with pleocytosis increased as infants were older: 59% in the first month of age, 74% in the second month, and 90% in the third month. This association was statistically significant.

**Conclusions:** For infants with enterovirus CSF infections, a lack of pleocytosis was associated with younger age and lower peripheral WBC count. Infants with enterovirus SCF infections who are younger or have a lower WBC count may be less likely to have pleocytosis. CSF enterovirus PCR may be warranted in children with these factors who lack CSF pleocytosis. This may help to rationally limit the children who receive enterovirus PCR tests in the future.

**Reviewer's Comments:** PCR is expensive and time consuming. This study helps determine which infants are most likely to need that test. Further studies should be done to confirm new protocols, preferentially using PCR on these patients. In the old days, these children seen in the summer time would often not even have a lumbar puncture performed. Wouldn't the lawyers love that today! (Reviewer-Aaron E. Carroll, MD, MS).

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Keywords: Enterovirus, CNS Infections, CSF Pleocytosis

Print Tag: Refer to original journal article
Invasive pneumococcal infections caused by PCV7 serotypes are rare in children who have completed the recommended PCV7 series.

**Background:** The incidence of invasive pneumococcal infections in children has dropped significantly since the introduction of the heptavalent pneumococcal vaccine (PCV7). However, the vaccine does not cover all pneumococcal serotypes, so the incidence of infection in vaccinated children is unknown.

**Objective:** To characterize cases of invasive pneumococcal infection in vaccinated children.

**Methods:** Cases were collected from both the Centers for Disease Control and Prevention’s passive and active (9 U.S. sites) surveillance systems. Unique cases were collected from October 2001 through February 2004. A "breakthrough infection" occurred when a child who received ≥1 PCV7 dose, but had not completed the PCV7 series, was infected with a vaccine serotype. A vaccine failure occurred when a child who had completed the PCV7 series was infected with a vaccine serotype. Demographics, illness onset, infection type, outcome, comorbid conditions, vaccination history, and pneumococcal serotype were collected for each case. The authors compared case types between the 2 surveillance systems and explored factors associated with breakthrough infections in the active surveillance system.

**Results:** 753 cases of invasive pneumococcal infections in vaccinated children were found (376 through passive surveillance, 297 through active surveillance). Passive surveillance cases were less likely to be of African-American race or have only bacteremia and were more likely to be due to a vaccine serotype, have severe illness (eg, require hospitalization, present with meningitis) or have a comorbid illness. There were 155 breakthrough infections, 45% of which occurred in children with only 1 PCV7 dose. In a multivariate analysis, children with comorbid conditions had 2.8 higher odds (95% CI, 1.3 to 6.1) of being infected with a vaccine serotype than a non-vaccine serotype. There were 27 cases of vaccine serotype infection in children who completed the PCV7 series recommended for their age; 37% of these cases occurred in children with chronic illness (one-third of them in children with known immunosuppressive conditions). Most of these patients (67%) were hospitalized for their infection.

**Conclusions:** Most cases of invasive pneumococcal infections are caused by non-vaccine serotypes and very few are due to vaccine failures.

**Reviewer’s Comments:** This study is very relevant for the practicing physician. True, it appears that most cases of invasive pneumococcal infections are not directly preventable by vaccination because they are caused by non-vaccine serotypes. However, the authors found a number of vaccine serotype infections in children who had not yet completed their vaccinations and in children with a comorbid illness. Such findings reinforce the need to vaccinate all children to raise herd immunity against vaccine-preventable pneumococcus and to take care to ensure that children with comorbidities are vaccinated. But as is often the case in medicine, this is easier said than done. (Reviewer-Beth A. Tarini, MD).

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Keywords: Invasive Pneumococcal Infection, PCV 7, Breakthrough Cases, Vaccine Failure

Print Tag: Refer to original journal article
Many Parents Believe OTCs Are Safe

Physician and Parent Response to the FDA Advisory About Use of Over-the-Counter Cough and Cold Medications.

Garbutt JM, Sterkel R, et al:

Acad Pediatr 2010; 10 (January-February): 64-69

Although parents are largely aware of the FDA advisory, most believe that OTC cough and cold medications are safe and may continue to use them for their children.

**Background:** The Food and Drug Administration (FDA) has advised that over-the-counter (OTC) cough and cold medicines not be used in children <2 years old because of the potential for serious and life-threatening side effects.

**Objective:** To determine the effect of the FDA advisory on parent and pediatrician behavior.

**Design:** Survey.

**Participants/Methods:** In 2008, community pediatricians were mailed a 27-item questionnaire assessing usual practice regarding recommending OTC cough and cold medicines, knowledge of and agreement with the FDA advisory, barriers to implementation of the advisory, and predicted impact of the advisory on patient care. Parents in pediatric offices were asked to participate in an anonymous 30-item paper questionnaire assessing attitudes and practice regarding use of OTC cough and cold medicines, knowledge of the FDA advisory, and how the advisory would affect the future care they would give their children with upper respiratory infections (URIs).

**Results:** Of the 105 participating pediatricians, 45% were male. Their mean age was 47 years and they had a mean of 16 years in practice; 75% were in suburban practices. Sixty-three percent of the pediatricians reported that their usual advice was to not use OTC cough and cold medications because they were not effective and may cause life-threatening side effects. All physicians were aware of the advisory, and 75% agreed with it. Commonly predicted barriers were parental demands for treatment (48%), lack of consensus among practice partners (15%), and the need for education for parents (14%) and staff (10%). Six percent and 29% reported that they would continue to recommend OTC cough and cold medications <2 years and children >2 years, respectively, while 41% were more likely to recommend supportive measures, such as honey or chicken soup. Of the 1265 parents interviewed, 44% reported using an OTC cough or cold medication for their child (18% for children <2 years old and 53% for children 2 to 11 years old), and 74% had at least 1 such OTC medication at home. Seventy percent believe that OTC cough and cold medications made children feel better, 60% agreed that these medications would not treat the disease, and 32% agreed that they had potentially serious side effects. In addition, 73% were aware of the advisory, but 15% of parents of children <2 years old and 60% of parents of children 2 to 11 years of age reported that they would still use the products for their child, while 21% reported that they would be more likely to request an antibiotic, and 40% would be more likely to request an alternative symptomatic treatment.

**Conclusions:** Although parents and pediatricians are largely aware of the FDA advisory, most parents believe that OTC cough and cold medications are safe and may continue to use them. Pediatricians need to also be aware that parents may be more likely to request alternative therapy, including antibiotics.

**Reviewer's Comments:** The parent population here was predominantly suburban, Caucasian, and non-Medicaid, so the results may not be generalizable. In addition, parents may have been less than forthcoming about their actual intentions and practice. We need to continue to offer education about the risks and non-benefits of these therapies. (Reviewer-Rachel Moon, MD).

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Keywords: OTC Medicines, Side Effects, FDA Advisory, Parent/Physician Response

Print Tag: Refer to original journal article
Day Care Centers Harbor MSSA

Epidemiology of Methicillin-Susceptible Staphylococcus aureus in a University Medical Center Day Care Facility.

Hewlett AL, Falk PS, et al:

Pediatr Infect Dis J 2010; 29 (February): 145-147

Day care centers serve as a reservoir for MSSA in the community setting.

**Background:** Methicillin-susceptible *Staphylococcus aureus* (MSSA) can cause invasive infections in children. Children in day care centers are at increased risk to spread MSSA through direct contact. However, the prevalence of MSSA in day care centers is unknown.

**Objective:** To determine the prevalence of MSSA in a day care center and to identify risk factors for colonization.

**Methods:** This was a cross sectional study of the University of Texas Medical Branch (UTMB) day care, which cares for children of UTMB employees ages 6 weeks to 5 years. No child or adult had an active MSSA infection at the day care during the study. Cultures were taken from children, adult day care workers, and the environment. Culture sites for children included the nares, oropharynx, axillae, groin area, and perirectal area. Cultures for adults were taken only from the nares and oropharynx. In addition, 195 environmental sites were cultured. Day care employees and parents of children also completed questionnaires to identify factors associated with MSSA colonization.

**Results:** 104 children were cultured as part of the study, and 21% of them were colonized with MSSA. The nares and oropharynx cultures were positive in 86% of colonized children, and all of the culture sites were positive in 100% of colonized children. Among employees, 32 were cultured, and 28% of them were colonized with MSSA. Almost 9% of environmental sites cultured positive for MSSA. One room of the day care had multiple positive culture sites with the same MSSA strain. A number of strains were cultured from both children and environmental surfaces. In a univariate analysis, older age and previous in-home child care were risk factors for colonization. Increasing time at the day care was nearly significantly associated with colonization. Factors protective against colonization included wearing diapers, longer time spent at a previous day care center, having received beta-lactam antibiotics, and having had an ear infection in the past 6 months. No employee factors were associated with colonization. Older age remained a risk factor for colonization (OR, 1.04; 95% CI, 1.01 to 1.07) and receipt of beta-lactams was a nearly significant protective factor (OR, 0.22; 95% CI, 0.05 to 1.03).

**Conclusions:** MSSA can be isolated from children, employees, and environmental surfaces in a day care center.

**Reviewer’s Comments:** It probably comes as no surprise to anyone that day care centers are a potential reservoir of microbes. However, what is interesting about this study is that the environment as well as the children and adults in the day care harbored MSSA, suggesting that more rigorous cleaning regimens are needed. Another interesting finding is that children who had received beta-lactam antibiotics may have been decolonized as a result. Perhaps in the future this may be considered another positive outcome of treating ear infections in young children. (Reviewer-Beth A. Tarini, MD).

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Keywords: MSSA, Day Care, Colonization

Print Tag: Refer to original journal article
New Treatment Options for Recurrent *Clostridium difficile* Infections

Treatment With Monoclonal Antibodies Against *Clostridium difficile* Toxins.

Lowy I, Molrine DC, et al:


Monoclonal antibodies, when added to antibiotic treatment for CD infection, reduce future recurrent CD infections.

**Background:** Reducing *Clostridium difficile* (CD) infection after antibiotics is difficult as many patients have recurrent CD infections. Finding new treatments to reduce recurrent infection are needed to reduce future antibiotic treatments.

**Objective:** To determine a new treatment with monoclonal antibodies with antibiotics so recurrent CD infection can be prevented.

**Methods:** This study took place in adult patients who had a positive stool for CD toxin and were taking oral metronidazole or vancomycin. Diarrhea was defined as ≥3 loose stools per day for at least 2 days. Patients were randomly selected to be treated with monoclonal antibodies (CDA1 with CDB1) against CD toxins or a placebo saline infusion. Patients submitted stool culture for CD upon entry into the study and were followed for 84 days by phone. Recurrence was defined as a positive CD infection by toxin analysis associated with diarrhea.

**Results:** 200 patients were enrolled from a group of 7396 patients with CD infection. Of the 200 patients, 101 were in the antibody group and 99 were in the control placebo group. Seven percent of the antibody group had a recurrent CD infection, but 25% had a recurrent CD in the placebo group. When looking at recurrent diarrhea with or without confirmation of CD toxin, there were 28% in the treatment as compared to 50% in the placebo group. The researchers also looked at reduction of symptoms of the initial CD infection, and there were no differences between the groups. The hospital readmission rate from recurrent CD infections was 9% in the antibody group and 20% in the placebo group. There were no differences in adverse events between the groups, and there were similar amounts of deaths (8 vs 7). No deaths were due to or related to the infusion of antibodies.

**Conclusions:** Monoclonal antibodies when added to antibiotic treatment for CD infection reduced future recurrent CD infections.

**Reviewer's Comments:** This study was in adults, but like many studies in adults, these data could be useful in studies for children. Monoclonal antibodies for prophylaxis are commonly used for the prevention of respiratory syncytial virus in high-risk infants. In the future, a CD antibodies infusion could be helpful for those who are at high risk for recurrent infection or have multiple exposures to broad spectrum antibiotics that in many cases precede the CD infections. (Reviewer-Charles I. Schwartz, MD).

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**Keywords:** *Clostridium difficile* Infections, Monoclonal Antibodies Treatment

**Print Tag:** Refer to original journal article
The greater costs of a VATS in patients with complicated pneumonia is likely off-set by shorter length of stay and the need for further treatments and procedures making it equivalent in overall costs to chest tube placement alone.

**Background:** It is estimated that up to one-third of pediatric community-acquired pneumonia admissions are complicated by an empyema. There have been conflicting research results on the efficacy and cost of video-assisted thoracoscopic surgery (VATS) versus primary chest tube (CT) intervention for complicated pneumonia.

**Objective:** To report on the costs of VATS versus CT placement for empyema to assess if VATS shows cost-savings over CT.

**Design:** Retrospective cohort study.

**Participants:** Eligible patients were between 12 months and 18 years of age. All had pneumonia with empyema and received VATS or CT placement. Exclusion criteria included thoracotomy or an increased risk of severe infection due to other health problems.

**Methods:** Participants were discovered by ICD-9 codes for pleural effusion from the Pediatric Health Information System (PHIS) database, which is data from 27 pediatric hospitals within the U.S. From this, procedure codes were reviewed to identify VATS versus CT placement. The primary end point of the data analysis was the price/wage index adjusted total hospital charges during the index hospitalization, which includes room, pharmacy, radiographic charges, and clinical services charges. Pharmacy and radiographic charges were also independently assessed.

**Results:** The median hospital charge was $36,000. VATS participants incurred neither higher pharmacy nor total charges than CT placement participants, but they did have lower radiographic charges. When stratified, there was also no difference in total charge by age group. Of note, 1.5% of all CT participants were re-hospitalized, while no VATS participants were; however, the charge of the second hospitalization was not included in the analysis.

**Conclusions:** There was no total cost difference between VATS and CT placement despite the higher procedural cost of VATS. The investigators conclude that this implies that other costs (eg, length of stay or additional procedures) may have offset this cost.

**Reviewer’s Comments:** The investigators, rightfully so, highlight the study’s shortcomings. It did not assess CT placement plus fibrinolysis, which other studies have suggested are equivalent in efficacy and cheaper than VATS. Additionally, this study’s patient population came exclusively from tertiary pediatric hospitals, so it likely not generalizable to community hospitals where surgeons likely may not possess similar VATS skills. I find both shortcomings frustrating for I work at a hospital that preferentially performs CT plus fibrinolysis because of previous cost analysis research, but I trained at an institution that preferentially performed early VATS. Anecdotally, I feel that the latter garners a shorter length of stay and fewer repeat procedures. By not comparing apples to apples, this study fails to provide the fuel I needed to go forth and argue more aggressively for early VATS. I would have also liked the analysis to include the rehospitalization charges.

(Reviewer-Lisa Humphrey, MD).

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Keywords: VATS, Chest Tube, Complicated Pneumonia
Procalcitonin (PCT) as an inflammatory marker has advantages over C-reactive protein in that PCT rises more rapidly during infection and is less likely to have overlapping values in bacterial versus viral infections.

**Background:** Procalcitonin (PCT), the prohormone of calcitonin, was noted in the 1990s to be increased in the sera of patients with systemic inflammatory conditions, severe mechanical trauma, and extensive surgery. The rapid elevation of PCT that occurs in the setting of systemic bacterial infection suggests a possible role in the acute immune response, but an exact physiologic function for PCT has not been determined.

**Objective:** To review the literature regarding the utility of the use of PCT in children in an emergency department (ED) setting.

**Design/Methods:** Literature review.

**Results:** The authors review the use of PCT in severe bacterial infections, including meningitis and sepsis. PCT is felt to have a better predictive value than C-reactive protein (CRP) and a peripheral white blood cell (WBC) count. Viral infections rarely cause a significant increase in PCT. When compared to CRP, PCT levels begin to rise within 2 to 4 hours after injection of endotoxin in healthy volunteers compared to 12 hours for CRP. In patients with fever without localizing signs of infection, PCT was found to be a better marker (compared to CRP, WBC count, or absolute neutrophil count [ANC]) in identifying serious bacterial infection in patients with fever <8 hours. Results of the use of PCT to distinguish bacterial versus viral pneumonia are inconsistent. PCT has not been shown to be helpful in the diagnosis of acute appendicitis. Limited studies with PCT indicate a possible value in determining which patients with urinary tract infections have upper tract involvement. Serial PCT measurements have been found to be potentially valuable in following the trend of an illness. However, because PCT levels vary over an enormous range, the authors caution that single measurements may be inadequate and misleading.

**Conclusions:** PCT appears to be an excellent marker of severe bacterial infection and sepsis in children and may have multiple potential applications in both the pediatric ED and intensive care unit when compared to more traditional markers of inflammation such as CRP and leukocyte count.

**Reviewer’s Comments:** The quest for the magic diagnostic bullet continues. In the area of fever without localizing source in an ED setting, a reliable diagnostic indicator might spare younger children a major work-up. The remarkable success of the conjugate pneumococcal vaccine has certainly lessened the likelihood of occult bacteremia in febrile children ages 3 to 36 months. This review demonstrates that we will need to pick our spots when PCT becomes more widely available. As the authors note, serial measurements may be more helpful in assisting in response to therapy, particularly for hospitalized children who are quite ill with pneumonia or sepsis. Just as CRP measurements seemed to improve more quickly compared to sedimentation rates, it looks like the PCT may have the CRP beat. Now, we await the inevitable studies on cost-effectiveness.

(Reviewer-Mark F. Ditmar, MD)

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**Keywords:** Procalcitonin, Bacterial Infection, Emergency Department

**Print Tag:** Refer to original journal article
Soy formula has similar effects on the growth of reproductive organs as milk formula and breast milk.

Background: Despite American Academy of Pediatrics (AAP) recommendations supporting breast-feeding during infancy, approximately 20% to 25% of infants are fed soy-based infant formula (SF) at some point in the first year of life. Effects on the uterus and mammary tissues have been shown in rats fed purified isoflavones suggesting potential estrogenic effects of SF. Studies in humans have been inconclusive.

Objective: To compare the sizes of breast buds, ovaries, uterus, prostate and testes by ultrasound in infants fed breast milk (BM), cow's milk formula (MF), and SF.

Design: Longitudinal cohort study.

Participants: 120 infants aged 4 months (40 BF, 41 MF, and 39 SF).

Methods: Eligible infants were born to mothers who were healthy and denied using soy or estrogenic products during pregnancy. Infants were born at term and appropriate for gestational age (AGA) with no conditions affecting development. All BF infants were breast-fed exclusively for 4 months. A minority of MF and SF infants switched from BM or BM and MF prior to 4 months. Anthropometric assessments and body composition were determined. Sonographic measurements of breast buds, uterus, ovaries, prostate and testes were obtained and read by a single radiologist blinded to treatment group. Uterine shape was identified and ovarian cysts were noted. Formulae were used to measure organ volumes.

Results: Maternal anthropometrics, socioeconomic status, and race were similar between groups. Infant anthropometrics were also similar, except gestational length was significantly greater in SF and BF girls compared to MF girls, and MF boys were significantly heavier at 4 months compared to SF boys. Among girls, breast and uterine volume, as well as uterine shape, were similar in all 3 groups. MF girls had greater ovarian volume than BF girls. Ovarian cysts were similar, but BF and MF girls had more follicles per cyst per ovary than SF girls. Among boys, no differences were seen comparing breast bud or prostatic volumes. Testicular volume was greater in BF boys compared to SF and MF boys. No differences were seen in body composition.

Conclusions: Anthropometric development and body composition do not differ between SF and BF infants. MF infants may have advanced ovarian development and smaller testicular volume. SF does not appear to promote estrogenic effects.

Reviewer’s Comments: There are some limitations to this study including the low number of subjects, the fact that they were studied at one point in time, and that some infants in the SF and MF groups were not exclusively fed those formulas. Of course breast milk remains the ideal modality of nutrition in infants, but this study should provide some reassurance that soy formula does not appear to have estrogenic effects on the organs studied. (Reviewer-Seth L. Schulman, MD).

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Keywords: Soy Formula, Breast Milk, Estrogenic Effects, Reproductive Organs

Print Tag: Refer to original journal article
In addition to the known associations with prematurity and low birth weight, strabismus risk is increased by low socioeconomic status and need for assisted delivery.

**Background:** Strabismus is known to occur with increased frequency in children with neurodevelopmental disorders, low birth weight, and prematurity. Other early influences, and perhaps modifiable risk factors, have not been thoroughly investigated.

**Objective:** To investigate types and prevalence of early-life risk factors for strabismus.

**Methods:** Prospective data were collected from 2000-2005, as part of the United Kingdom's Millennium Cohort Study. All children residing in the U.K. at 9 months of age and eligible for the universal state health benefit were recruited to participate. Questionnaire items were designed to elicit information regarding vision and ophthalmologic problems at 3 years. Parental responses suggesting strabismus (including colloquial phrases such as "eyes-crossing", "wandering eye") were validated if the child had been treated for strabismus or other long-standing eye conditions, or other relevant disorders were reported (such as hypermetropia or amblyopia). Strabismus was labelled "neurodevelopmental" if there was a coexisting underlying systemic condition (ie, Down syndrome or cerebral palsy) and "isolated" in the absence of associated conditions. Demographic factors, perinatal details (prenatal exposures, gestational age, delivery complications), and anthropometric data were analyzed.

**Results:** Of the 14,980 children included in the study, 343 reported strabismus for a prevalence of 2%. Only 20 children (5.8%) had underlying neurodevelopmental disorders, such as Down syndrome, cerebral palsy, or other mental/behavioral disabilities. In multivariable analysis for isolated strabismus, many of the previously identified risk factors were again significantly associated, including low birth weight and decreasing gestational age. Additional risk factors included socioeconomic status (showing an inverse relationship) and birth by assisted delivery. Nonwhite maternal ethnicity, on the other hand, was protective for isolated strabismus; children with African and Caribbean mothers were only one-fifth as likely to be affected as those with white mothers. Neurodevelopmental strabismus was more likely in mothers with illnesses during pregnancy (particularly Diabetes Mellitus), late pregnancy smokers, and low birth weight for gestational age and sex. Socioeconomic status was independently associated by a U-shaped relationship.

**Conclusions:** The risk for isolated strabismus is increased by low socioeconomic status and assisted delivery, and decreased by nonwhite maternal ethnicity. Risk for neurodevelopmental strabismus is increased by maternal illness during pregnancy, smoking, and extremes of socioeconomic status.

**Reviewer's Comments:** This large population-based study suggests that among children with strabismus, >90% have isolated forms. Non-white ethnicity may be a surprising risk factor in these cases, especially in light of its inverse relationship to socioeconomic status. The association between neurodevelopmental strabismus and the extremes of socioeconomic status, rather than a simple inverse relationship, also may demonstrate a complex interplay of etiologic factors. The findings raise questions regarding lifestyle influences before and during pregnancy and may underscore the importance of sociocultural and behavioral prenatal patterns that affect steps in the biological pathways leading to strabismus. (Reviewer-Alyssa Siegel, MD).

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**Keywords:** Strabismus, Risk Factors

**Print Tag:** Refer to original journal article
Chiropractic Manipulation Not Beneficial for Cervicogenic Headaches

Lack of Efficacy of Manual Therapy in Children and Adolescents With Suspected Cervicogenic Headache: Results of a Prospective, Randomized, Placebo-Controlled, and Blinded Trial.

Borusiak P, Biedermann H, et al:
Headache 2010; 50 (February): 224-230

The use of cervical SMT does not result in any benefits for duration or intensity of headaches or consumption of analgesics when compared to placebo for pediatric patients with suspected cervicogenic headaches.

**Background:** Cervicogenic headache is a syndrome of chronic pain, usually hemicranial, commonly referred from the bony or soft tissues of the neck to the head. While there is some overlap, it is felt to be clinically distinguishable from other headache types, such as migraine or tension.

**Objective:** To assess the effect of spinal manipulative therapy (SMT) as an effective treatment.

**Participants/Methods:** 52 patients (7 to 15 years of age) with weekly headaches for at least 6 months who were seen at a headache clinic in Germany participated in the study. Baseline documentation was done, and then patients were randomized to true SMT or sham therapy. Both therapies involved touch, but the sham treatment involved lighter touch without high-velocity, low-amplitude, lateral-directed manipulation. Participants recorded their perception of the treatment (sham vs real SMT). Adverse events were noted. Patients were seen after 2 months, and outcome measures assessed included percentage of days with headache, total duration of headache, days of school absence due to headache, consumption of analgesics, and intensity of headache.

**Results:** When the groups were compared, there was no significant difference between the groups who received placebo or true manipulation in terms of outcome.

**Conclusions:** Cervical SMT was not felt to be efficacious in a study of 52 patients with suspected cervicogenic headache.

**Reviewer's Comments:** Chiropractic therapy, and in particular manipulative therapy, widely practiced on children continues to thrive despite a lack of studies demonstrating its effectiveness. This study is another example. The study itself has a number of design flaws (eg, outcomes were based on recall rather than daily diary notations). Certainly, chiropractic practitioners might argue that the type of manipulation or frequency of therapy in this study was improper or insufficient. However, the onus should be on the practitioner of such methodologies to prove their worth. For those of us who are nonbelievers, we await those studies. (Reviewer—Mark F. Ditmar, MD).

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Keywords: Cervicogenic Headache, Manual Therapy

Print Tag: Refer to original journal article
Helmet use with snowboarding and skiing reduces the risk of head injury without any evidence of increased neck injury.

**Background:** Helmets are commonly recommended for many sports, including skiing and snowboarding. One concern is that the added weight of a helmet in children with the larger head-to-body ratios could increase the risk of neck injury.

**Objective:** To determine the effect of helmets on the risk of head and neck injuries associated with skiing and snowboarding.

**Design:** Meta-analysis of studies that evaluated injuries from skiing and snowboarding.

**Methods:** Studies that involved the terms head injury/trauma, helmet, and skiing or snowboarding were evaluated for potential analysis. Of the 184 studies identified, 12 met criteria as set forth by the investigators of this study. Statistical analysis was used to perform meta-analyses of these selected studies. The 12 studies included 10 case-controlled studies, a case-controlled/case-crossover study, and a cohort study. Five studies were from Europe, 6 were from North America, and 1 was from Asia.

**Results:** The total number of injuries studied included 36,735 people who did not wear a helmet and 9829 people who did wear a helmet. Eleven studies looked at head injuries and 5 of these did evaluate neck injuries. One study only looked at neck injuries. Nine of the studies showed that helmets reduced the risk of head injuries. The risk of injury was reduced by 35%. Severe head trauma was defined as referral to an emergency room/hospital or evacuation by ambulance. There was no difference in the incidence of severe injuries. There was a significant reduction of risk of head injury in beginner skill levels of skiing and snowboarding. There were no differences in head injury between skiers and snowboarders. Helmet use did not increase the risk of neck injuries. Two studies in children showed no association between helmet use and neck injuries.

**Conclusions:** Helmet use with snowboarding and skiing reduced the risk of head injury without any evidence of increased neck injuries.

**Reviewer’s Comments:** In some meta-analysis studies, there are conclusions that can only be made due to statistical manipulation of the data. In this study, it is quite clear that the use of helmets has a protective effect for prevention of head injuries and did not increase the risk of neck injuries. Based on data from these 12 studies, parents should be encouraged to use helmets to protect their child’s heads without an increase in the risk of neck injuries. (Reviewer-Charles I. Schwartz, MD).

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Keywords: Skiers, Snowboarders, Head & Neck Injuries, Helmets

Print Tag: Refer to original journal article