Can a Healthy Food Ordinance Improve Child Nutrition?


Researchers from multiple institutions conducted a study to assess the impact of legislation in San Francisco banning restaurants from including “free” toys in children’s meals that did not meet nutritional standards. The ordinance was enacted on December 1, 2011. For the study, adult/child (aged 0-12 years) dyads exiting 1 of 2 major fast-food-chain restaurants in the San Francisco area were surveyed. Three separate surveys were completed. The timing of the surveys coincided with the enactment of the citywide ordinance. Investigators conducted “pre-ordinance” surveys of restaurant customers during the period January-March 2011 and again during October-November 2011. A “post-enactment” survey was conducted January-March 2012. Surveys addressed meal purchasing priorities, habits and preferences relating to children’s meals and toys, awareness of the toy ordinance and calorie labels, foods and beverages ordered, and demographic/anthropometric data. Data calculated on ordered items included calories, total fat, saturated fat, trans fat, sodium, sugar, fiber, and protein. Outcomes of interest were differences across time in mean calorie content per purchase for all children, and for those ordering only children’s meals over the time period that surveys were conducted. In addition, changes in the nutritional content of children’s meals made by the restaurant chains over the study period were tracked.

Data were analyzed on surveys completed by 762 dyads during the 3 survey periods. Both restaurant chains chose to comply with the ordinance by offering toys with the children’s meals for an extra $0.10 (which was not prohibited by the explicit language in the legislation). In the post-enactment survey, 88% of those surveyed purchased the toy. Investigators found that no child’s meal at either restaurant met the standards. The ordinance was implemented positive nutritional changes in the children’s meals between the first and second survey periods. Although no changes in calories for all children’s orders over time were detected, calories in children’s meals did decrease across the study period (P < .001), likely due to changes in side dishes and beverages. Awareness of the toy ordinance among parents was highest immediately following its passage (45.2%), falling to 29.4% and finally 17.7% post-ordinance.

The authors conclude that although the changes in nutritional content of children’s meals were not directly related to the legislation, they were consistent with the intent of the ordinance.

Commentary by
Shelley Springer, MD, MBA, MSc, JD, FAAP, Big Lake, MN

Dr. Springer has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

The CDC estimates that the proportion of children aged 6-11 years in the United States who are obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12-19 years who are obese increased from 5% to nearly 21% over the same period.1,2 In an effort to reduce caloric intake, politicians, public health scientists, and other advocates have tried to “remove temptation” by legislating good nutritional habits such as with the ordinance studied here. New York City’s attempt to limit the size of sodas sold in restaurants, movie theaters, stadiums, and arenas to no more than 16 ounces is on hold until a Court of Appeals reviews lower court decisions prohibiting the ban.3 In 2013, as part of the 2010 Healthy, Hunger-Free Kids Act championed by Mrs. Obama, regulations were enacted to limit the amount of calories, fat, sugar, and sodium allowed in school snack foods, and required that they contain a certain portion of healthy ingredients. In February 2014, the Agriculture Department announced further regulations slated for the 2014-15 school year that would prohibit marketing of foods not meeting these guidelines in schools.4 It is unfortunate that what tastes the best is bad for you, and nutritionally poor foods are cheaper, more plentiful, and more easily accessible. As demonstrated in San Francisco, few people surveyed were aware of the ordinance after its implementation, and almost 90% paid the extra 10 cents for the toy. Is good nutrition the ultimate personal choice?

References

See related article on page 46.
Key words: obesity, calories, trans fat
Vaccination Status Impacts Severity and Duration of Pertussis


Investigators from multiple institutions analyzed data from an enhanced pertussis surveillance system in the Portland, OR metropolitan area to determine whether vaccination status had an impact on illness severity and cough duration. The study included participants 6 weeks to 18 years of age with confirmed Bordetella pertussis infection and onset between 2010-2012. Data collected included demographics, exposure to antimicrobials, and vaccination status. Information about severity of illness, cough duration, and exposures was obtained from interviews with community health nurses. Cases were considered severe if the infected individuals developed pneumonia, acute encephalopathy, seizures, or were hospitalized with any of these or other pertussis-related conditions. Participants who met the Advisory Committee on Immunization Practices (ACIP) recommended guidelines for their age were classified as up-to-date (UTD). Those who had received pertussis immunization, but did not meet ACIP recommendations for their age, were classified as vaccinated but not up-to-date (NUTD). Participants without documentation of immunization were classified as unvaccinated. Multivariate regression analyses were conducted to assess the independent association between immunization status and both severe disease and duration of cough during the pertussis illness.

Among the 753 individuals with confirmed pertussis during the study period, 633 were between 6 weeks and 18 years old; 624 (98.7%) had vaccination history and illness data. The median age was 9 years; 52.5% were female. Among participants, 46% were UTD on pertussis immunization, 26.8% NUTD, and 27.4% were unvaccinated. Antimicrobial therapy was initiated in 74.8% of patients, 26.8% NUTD, and 27.4% were unvaccinated. The introduction of acellular pertussis vaccines, Tdap vaccines, and the routine use of polymerase chain reaction testing for diagnosis. The current study demonstrates that while breakthrough pertussis infections still occur, severe illness is less likely in those fully immunized against pertussis. It is particularly important that less severe illness was seen in the youngest group, aged 6 weeks to 6 months, although this study did not address the problem of protection of infants below the minimum age for vaccination. The use of an enhanced surveillance system in a large metropolitan area provided strength to this study, with most vaccination histories and disease interviews being complete, and cough duration followed prospectively. While all observational studies have limitations due to surveillance data bias, the excellent surveillance system utilized kept bias (such as misclassification) to a minimum.

Multiple factors are likely contributing to the pertussis resurgence. Ideally, more efficacious vaccines will be developed to induce longer-lasting immunity and prevent spread from asymptomatic patients. Until then, this study strengthens the pediatrician’s immunization message that, while infections may occur, the current ACIP recommendations will result in decreased morbidity. For infants <6 weeks of age who cannot be vaccinated, the greatest protection will come from maternal third trimester Tdap immunization and immunization of caregivers.

The authors conclude that in patients with pertussis, those who were previously vaccinated were less likely to develop severe illness compared to unvaccinated patients. In all age groups, vaccinated patients had decreased cough duration.

Commentary by Michael K. Foxworth II, MD, FAAP, Pediatrics/Pediatric Infectious Diseases, HopeHealth, Inc, Florence, SC; University of South Carolina, Columbia, SC

Pertussis continues to be a problem in the United States, despite diligence of vaccination programs addressing the highest-risk group and those who are most likely to have waning immunity (infants and adolescents, respectively). Studies have shown that acellular pertussis vaccine-induced immunity diminishes each year after the fifth dose (see AAP Grand Rounds, February 2013;29[2]:13). The positive effect of Tdap vaccination on adolescent populations has been documented. Unfortunately, this has not impacted the group at highest risk of mortality from pertussis, infants <1 year old (see AAP Grand Rounds, July 2012;28[1]:3).

This is the first US study to address the severity of pertussis since the introduction of acellular pertussis vaccines, Tdap vaccines, and the routine use of polymerase chain reaction testing for diagnosis. The current study demonstrates that while breakthrough pertussis infections still occur, severe illness is less likely in those fully immunized against pertussis. It is particularly important that less severe illness was seen in the youngest group, aged 6 weeks to 6 months, although this study did not address the problem of protection of infants below the minimum age for vaccination. The use of an enhanced surveillance system in a large metropolitan area provided strength to this study, with most vaccination histories and disease interviews being complete, and cough duration followed prospectively. While all observational studies have limitations due to surveillance data bias, the excellent surveillance system utilized kept bias (such as misclassification) to a minimum.

Multiple factors are likely contributing to the pertussis resurgence. Ideally, more efficacious vaccines will be developed to induce longer-lasting immunity and prevent spread from asymptomatic patients. Until then, this study strengthens the pediatrician’s immunization message that, while infections may occur, the current ACIP recommendations will result in decreased morbidity. For infants <6 weeks of age who cannot be vaccinated, the greatest protection will come from maternal third trimester Tdap immunization and immunization of caregivers.

References

Key words: pertussis, epidemiology, surveillance
Investigators from the University of Virginia conducted a longitudinal study to examine the relationship between early adolescent pseudomature behavior (eg, minor delinquent activity, precocious romantic involvement, focus on physical appearance in friendships) and the following outcomes: adolescent and early adulthood peer relationships, and early adulthood alcohol/substance use and criminal behavior. The researchers followed a racially and socioeconomically diverse community sample of adolescents for a 10-year period. Participating adolescents were assessed annually at ages 13-15 with follow-up at ages 20-23. At each annual assessment between ages 13-15, adolescent participants nominated their closest same-gender friend and 2 other peers from within their extended circle of friends to participate in the assessment of peer attractiveness, closeness of friendships, and social competence and popularity.

Measures of pseudomature behavior at ages 13-15 included self-reported minor delinquent activity in the prior 6 months (eg, theft of items costing <$5 or destroying parental property), precocious romantic behavior (number of people “made out” with), and selection of attractive peers (physical attractiveness of peers coded from videotaped observations). Adolescent self-rated valuing of popularity (5-point scale at age 13) and popularity among peers (sociometric procedure where participants’ peers listed their 10 most “liked” peers at ages 13-15) were assessed. Measures assessed in adolescence and early adulthood were social competence (peer-completed scales), alcohol and substance use (self-reported questionnaires), and criminal behavior (interview). After controlling for potentially confounding variables, the associations between pseudomature behaviors and the outcomes were assessed.

A total of 184 adolescents participated in the study; follow-up data were collected on 175 (95%). Early adolescent pseudomature behavior was linked to a strong desire for peer approval, as measured through valuing of popularity ($P < .05$). While pseudomature behavior predicted popularity in the short term (age 13), the elevated popularity of adolescents with pseudomature behavior decreased over time and was no longer present by age 15. Pseudomature behavior in early adolescence predicted lower levels of early adulthood peer-rated social competence ($P < .01$). Adolescent pseudomature behavior also predicted criminal behavior and future use of and problems with alcohol and marijuana in early adulthood ($P < .001$ for all outcomes).

The investigators conclude that a constellation of pseudomature behaviors in early adolescence predicted difficulties in social functioning in early adulthood and may indicate deviation from healthy psychosocial competence.

**Commentary by**
Charlene A. Wong, MD, FAAP, Robert Wood Johnson Foundation Clinical Scholars Program, University of Pennsylvania, Philadelphia, PA

Dr. Wong has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Minor delinquencies, early romantic behavior, and a focus on physical attractiveness when choosing friends are often seen as normal features of adolescence, perhaps not even warranting discussion during most busy adolescent clinical encounters. Teens use these pseudomature behaviors to act older than their age to gain popularity, with the goal of being considered one of the “cool kids.” While these behaviors may seem common, the results of the current study provide evidence that these common behaviors, if present in early adolescence, may signal higher risk for psychosocial issues up to 10 years later.

The previously “cool kids” lose popularity as they pass through adolescence and are less able to form meaningful friendships in young adulthood. One possible explanation for this pattern may be that their focus on superficial, pseudomature behaviors in adolescence replaces opportunities to develop positive social skills and mature social competence over time.1

Even more worrisome was the association of early adolescent pseudomature behaviors with problematic alcohol and drug use and more serious criminal behaviors in young adulthood. Though alcohol and drug use and minor delinquencies in adolescence were also predictive of worsening issues in adulthood, early adolescent pseudomature behaviors were even stronger predictors for these risky behaviors. Hence, while pseudomature behaviors are commonplace and potentially even normal as older adolescents gain autonomy, form more mature friendships, and practice romantic relationships, these behaviors when present too early in adolescence may be red flags for pediatric providers seeing young teens in clinic.

The current study is limited by a small sample size selected from a single public school in the southeastern United States. The researchers were also unable to examine their outcomes in the context of pubertal development; earlier onset of puberty among teen girls has previously been linked to psychosocial risk-taking behaviors and psychopathology.2,3 Additionally, work is needed to explore how parents and providers might effectively intervene when pseudomature behaviors are detected in early adolescence.

**References**

**Key words:** adolescents, social adaptation, substance use
Is Metronidazole Beneficial for *Dientamoeba fragilis* Infection?


**PICO**

**Question:** Among children with *Dientamoeba fragilis* infection and chronic gastrointestinal symptoms, does metronidazole therapy improve clinical outcomes?

**Question type:** Intervention

**Study design:** Randomized controlled

Investigators from Denmark conducted a randomized, double-blinded, placebo-controlled trial to evaluate the clinical and microbiological efficacy of metronidazole for treatment of *Dientamoeba fragilis* infection in children with chronic gastrointestinal (GI) complaints. Children 3-12 years of age with ≥4 weeks of GI symptoms and a fecal sample positive for *D fragilis* by real-time polymerase chain reaction (PCR) were randomized to a 10-day course of oral metronidazole or placebo. Prior to trial enrollment, parents assessed their child’s GI symptoms using a visual analog scale (VAS) and each child had a physical examination. Fecal samples were collected on days 14, 28, 42, and 56 after end of therapy. The primary study outcome was change in level of GI symptoms from pretreatment to 14 days after end of treatment as assessed by VAS. Secondary study outcomes included eradication of *D fragilis* infection and adverse events.

Among 1,024 children who were invited to participate, 106 responded and were randomized and 96 participants (48 in each group) were included in the analysis. At baseline, most parents reported abdominal pain as their child’s primary GI symptom. Diarrhea, loss of appetite, and anal itching were also commonly reported.

The mean change in GI symptoms from pre- to posttreatment as assessed by VAS did not differ significantly (P = .8) between the metronidazole (-1.8; 95% CI, -2.5 to -1.1) and the placebo group (-1.6; 95% CI, -2.3 to -0.9). The rate of eradication of *D fragilis* in the metronidazole arm (adjusted for effect of placebo) was 62.5% (P < .001) at day 14 but declined to 24.9% (P = .02) by day 56. The most commonly reported adverse effects for the metronidazole and placebo arms were nausea (65% and 42%) and vomiting (33% and 10%). No serious adverse events were observed.

The investigators conclude that metronidazole provided no clinical benefit for children with chronic GI symptoms who have *D fragilis* isolated from their stools. The microbiological effect of metronidazole was only moderate and transient.

**Commentary by**

**Rebecca C. Brady, MD, FAAP,** Infectious Diseases, Cincinnati Children’s Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati, OH

Dr Brady has disclosed no financial relationship relevant to this commentary. This commentary does contain a discussion of an unapproved/investigative use of a commercial product/device.

*D fragilis*, an intestinal parasite, may or may not be associated with symptoms. Treatment is often considered when the organism is the sole pathogen isolated in stool samples from patients with chronic abdominal pain or diarrhea. Metronidazole, paromomycin, or iodoquinol are potential therapies, but none is FDA-approved for this indication. Metronidazole is often selected because it is readily available and physicians are familiar with it.

This study is the first randomized, placebo-controlled trial of metronidazole for the treatment of *D fragilis* infection in children. Its strengths are the inclusion of children who had a positive real-time PCR for *D fragilis* and ≥4 weeks of GI symptoms. Real-time PCR detects low levels of trophozoites that may be missed by microscopy alone. Adherence to the study medications was excellent and the children were followed for 8 weeks after the end of treatment. The study’s weaknesses are the inclusion of only Danish children and the low participation rate (about 10% of those invited by mail responded). It is possible that the children who participated in the study had clinical profiles that were different from those who did not. The primary outcome was based on the parent’s report of a single value on a VAS as a measure of their child’s total GI symptoms. There may have been changes that were not elicited by using the VAS.

Nevertheless, this study showed that metronidazole did not provide clinical benefit over placebo for treatment of dientamoebiasis among children with chronic GI symptoms. There was a high rate of either relapse or reinfection after therapy was stopped. Nausea and metallic taste are potential side effects of metronidazole. When a child with chronic GI symptoms has *D fragilis* detected from stool samples, it may be prudent to do a trial of “watchful waiting” and assess for other causes before starting metronidazole.

**References**


**Key words:** *Dientamoeba fragilis*, metronidazole, chronic abdominal pain

Visit [www.GrandRoundsBlog.org](http://www.GrandRoundsBlog.org) to read a post about this article appearing this month.
Risk Factors for Celiac Disease: Genetics vs Environment


**PICO**

**Question:** Among children identified at birth as having high-risk HLA haplotypes, what is the incidence of celiac disease autoimmunity and celiac disease?

**Question type:** Descriptive

**Study design:** Prospective cohort

**Editors’ Note**

The results of this study underscore the premise that celiac disease is not just genetically controlled; environmental factors clearly influence expression of the disorder. Surprisingly, individuals from Sweden who were exclusively breastfed for the longest period of time, but had gluten-containing cereal introduced into their diets earlier than participants from other countries, had the highest rate of celiac disease. The contributions of diet, gut microflora, heredity, and timing of gluten introduction need further study. In the future, we may be able to manipulate environmental factors in order to diminish celiac disease symptoms in susceptible individuals.

**References**


**Key words:** celiac disease, environmental factor, HLA haplotype

**Commentary by**

Shova Subedi, MD and Neal S. LeLeiko, MD, PhD, FAAP, Alpert School of Medicine at Brown University and Pediatric Gastroenterology, Nutrition and Liver Diseases, Hasbro Children’s Hospital/Rhode Island Hospital, Providence, RI

Drs. Subedi and LeLeiko have disclosed no financial relationship relevant to this commentary. The commentary does not contain a discussion of an unapproved/investigational use of a commercial product/device.
Investigators from Duke University conducted a study of children with congenital heart disease (CHD) who required surgery to determine their predicted increased cancer risk given their cumulative exposure to radiation from imaging modalities. Investigators included children ≤6 years of age who had previously undergone 1 of 7 primary surgical procedures for CHD (isolated atrial septal defect [ASD] closure, isolated ventricular septal defect closure, atroventricular canal defect repair, tetralogy of Fallot repair, isolated arterial switch operation, cardiac transplantation, and Norwood operation) between 2005-2010. Patient demographics and imaging modality types were also collected from the electronic health record (EHR).

Radiation exposure data for each participant from all radiation-producing imaging modalities documented in the participant’s EHR was estimated in millisieverts (mSv) from birth. Cumulative effective dose estimates were calculated by summing effective doses over each patient’s imaging history. Lifetime attributable risk (LAR) of cancer above baseline was estimated using models that incorporated prior epidemiological data suggesting that the excess relative cancer risk in the study population was 0.035 per 1-mSv exposure at mean follow-up of 10 years (given the shorter life expectancy of those with CHD) as well as background cancer rates based on reported US 5-year incidence for adolescents.

A total of 337 participants who underwent 13,932 radiation-producing imaging examinations were included in the analysis. The median number of imaging examinations per participant was 17 and the median cumulative radiation exposure per participant was 2.7 mSv (range: 0.1-76.9 mSv). Participants who had undergone a Norwood procedure (28.93 mSv) or cardiac transplantation (63.79 mSv) had the highest cumulative radiation. Chest radiographs were the most common radiation-producing imaging modality performed, but only produced 0.01 mSv of radiation per study. The modality with the highest cumulative radiation was chest CT angiography (18.28 mSv per study).

The overall LAR of cancer above baseline was 65 cases per 100,000 children exposed. LAR was highest for participants who had had cardiac transplantation (1,677 cases/100,000) and lowest for those who had ASD closure (6 cases/100,000). LAR was significantly higher in females compared to males per 1 mSv of radiation exposure (41 cases/100,000 vs 22/100,000, P > .001).

The authors conclude that children with CHD can be exposed to large cumulative radiation doses, increasing their LAR of cancer.

**Commentary by**

**Jeffrey B. Anderson, MD, MPH, FAAP, Cardiology & Cardiac Surgery, Cincinnati Children’s Hospital, Cincinnati, OH**

Dr. Anderson has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.
Effect of Osteopathic Manipulation on Middle Ear Effusion


Investigators from multiple institutions conducted a randomized controlled trial to evaluate the effectiveness of osteopathic manipulative treatment (OMT) in hastening resolution of middle ear effusion (MEE) in children with acute otitis media (AOM). Between 2007-2009, children between the ages of 6-24 months with the clinical diagnosis of AOM based on the 2004 AAP guidelines and an abnormal tympanogram were enrolled in the study. Enrolled children were randomized to either the standard care plus OMT (SC+OMT) treatment group or standard care-only (SCO). All patients had an initial visit followed by a weekly study visits. Parents were also trained to use the acoustic reflectometer (AR) and instructed to perform daily AR readings. At each study visit, a tympanogram was performed on each ear. Participants in the SC+OMT group received OMT on visits 1, 2, and 3. A total of 7 OMT practitioners were involved in the study and were blinded to all data collected and patient outcomes. These practitioners used a standardized OMT treatment protocol which included 9 commonly used manual therapy techniques to address somatic dysfunction in the pelvis, thoracolumbar junction, diaphragm, rib cage, neck, and head. The treatments took approximately 20 minutes to complete. The primary study outcome was resolution of MEE following AOM; resolution of MEE based on AR readings was a secondary outcome.

The investigators enrolled 52 children; 2 were excluded because of a lack of any interpretable tympanogram readings. There were 24 children in the SCO group and 26 children in the SC+OMT group; 43 completed the study. Tympanogram data from 76 ears were included (38 from SCO; 38 from SC+OMT). Data from 28 ears were excluded because they were either normal or uninterpretable. Analysis of tympanogram data showed a significantly greater rate of resolution at visit 3 in the SC+OMT group (68%) compared with the SCO group (42%; OR = 2.98; 95% CI, 1.16-7.62). The AR data analysis also showed a greater rate of resolution of MEE at visit 3 for the SC+OMT group compared to the SCO group (P = .02).

The authors conclude that the adjunctive use of OMT with antibiotic therapy hastens the resolution of MEE 2 weeks after onset of AOM.

Commentary by
Robert C. Lee, DO, MS, FAAP, Children’s Medical Center at Winthrop-University Hospital, Mineola, NY

Dr Lee has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Persistent MEE is a common sequela following resolution of AOM. It is estimated that 60% to 70% of children have MEE 2 weeks after successful antibiotic treatment, 40% at 1 month, and 10% to 25% at 3 months. This is especially concerning for children at risk for speech, language, or learning problems because they may be adversely affected by hearing loss associated with MEE. Tymanostomy tubes are widely used in the surgical management of persistent MEE lasting 3 months or longer associated with hearing difficulties. The use of complementary and alternative medicine, especially manual manipulations involving osteopathy and chiropractics, for AOM has not been studied in well-designed, randomized, controlled trials. OMT has potential applicability in children with AOM due to the anatomic structures surrounding the middle ear. However, previously published studies have shown conflicting results in regards to OMT in the management of recurrent AOM. The natural history of MEE is such that anecdotal or case reports can appear to support the benefit of any complementary and alternative medical therapy.

Results from this study suggest that OMT administered with antibiotic treatment resulted in faster resolution of MEE at 2 weeks than standard care alone. However, these results would be more meaningful if a larger sample size had been included and fewer data points had been excluded from analysis. A randomized controlled trial design involving manual manipulation should include a sham protocol to control for potential therapeutic effects of touch and belief. When participants are blinded to group assignment, placebo effect can be controlled. The jury is still out on whether OMT can be recommended as a complementary and alternative medicine in the treatment of AOM.

Reference

Key words: osteopathic manipulative treatment, acute otitis media, middle ear effusion

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Frequency of Concurrent Urinary Tract and RSV Infections

Investigators from Lincoln Medical and Mental Health Center and Weil Cornell Medical College, New York, NY reviewed clinical data on infants, 2-12 months of age, admitted with fever and a positive rapid respiratory syncytial virus (RSV) antigen detection test to determine if changes to the American Academy of Pediatrics clinical practice guidelines (AAPCPG) for diagnosing urinary tract infection (UTI) would lead to a lower incidence of diagnosed UTI as compared to rates of UTI using the criteria in the previous version of the guidelines.1,2

Infants to a lower incidence of diagnosed UTI as compared to rates of UTI (AAPCPG) for diagnosing urinary tract infection (UTI) would lead the American Academy of Pediatrics clinical practice guidelines test to determine if changes to virus (RSV) antigen detection admitted with fever and a positive rapid respiratory syncytial virus (RSV) antigen detection test to determine if changes to the American Academy of Pediatrics clinical practice guidelines (AAPCPG) for diagnosing urinary tract infection (UTI) would lead to a lower incidence of diagnosed UTI as compared to rates of UTI using the criteria in the previous version of the guidelines.1,2  

Infants were included in the study if they were admitted to the hospital, had a positive rapid RSV nasal antigen test, a temperature >100.4°F, and urine collected via suprapubic aspiration or urethral catheterization for evaluation of UTI. UTI was defined using both the 1999 AAPCPG and 2011 AAPCPG criteria. Pyuria was defined as either: presence of leukocyte esterase and/or nitrites on urine dip; >5 white blood cells (WBC) on centrifuged microscopy; or >10 WBC on an uncentrifuged specimen. Using the 1999 guideline criteria, patients with >10,000 CFU/ml were classified as having UTI. The criteria for diagnosis of UTI based on the 2011 guideline included both pyuria and >50,000 CFU/ml on culture. Of the 359 participants meeting inclusion criteria, 212 were male (59.1%). Among the males, 29.7% were circumcised, 48.6% were uncircumcised, and 21.7% had unknown circumcision status. Approximately half (48.5%) of the participants were found to have temperatures >102.2°F, and 78.3% had a WBC <15,000. Results of urinalysis demonstrated clinically significant pyuria in 40 participants (11.1%). Using the 2011 AAPCPG criteria for diagnosis of UTI, 4 participants (1%) were classified as having UTI while 22 participants (6%) met criteria for UTI using the 1999 guidelines (P = .001).

Positive urine cultures grew typical bacteria including Escherichia coli, Klebsiella pneumoniae, and Enterococcus spp. All participants with UTI based upon either the 1999 or 2011 guidelines had negative renal ultrasound and VCUG. The authors conclude that very few infants hospitalized with RSV bronchiolitis meet the 2011 AAPCPG criteria for UTI and that UTIs diagnosed by the previous AAPCPG may represent asymptomatic bacteriuria or a contaminant; therefore, less UTI screening in this population may be appropriate.

Diagnostic dilemmas often exist for busy physicians confronted with young infants admitted to the inpatient ward with RSV infection and fever. Does the fever indicate infection only with RSV, or is there a serious bacterial infection such as bacteremia, pneumonia, or UTI occurring simultaneously?3

The 1999 AAPCPG criteria for the diagnosis of UTI in young children did not include pyuria as a requirement for diagnosis, and urine cultures with >10,000 CFU/mL were considered as likely positive. The 2011 AAPCPG, on the other hand, requires pyuria and a urine culture with >50,000 CFU/mL. The 1999 recommendations were based on the theory that underdiagnosis of UTI in children might lead to recurrent UTI, renal scarring, hypertension, and chronic renal failure. More recent studies dispute this connection and suggest that the risks of prophylactic antibiotic therapy and diagnostic workup (drug reactions, bacterial resistance, radiation) may pose more of a problem than previously thought.4

The current study adds to the “less is more” mentality that we seem to be confronting more frequently when it comes to the management of infants admitted with RSV bronchiolitis, from both a diagnostic and therapeutic standpoint.5 For infants aged 2-12 months admitted for RSV bronchiolitis with fever, careful consideration should be given prior to obtaining catheterized urine specimens.

References

Key words: UTI, RSV, fever

HOSPITAL MEDICINE
Children with chronic disease often have cognitive impairments.\(^1,2\) Deficits in neurocognitive ability translate into reduced academic achievement, difficult social interactions, and lower quality of life. Identification of risk factors for poor outcomes will help direct limited fiscal resources.

There is little scientific literature, however, to delineate long-term consequences of disease and medical intervention. The low prevalence of many severe pediatric diseases limits the ability to perform quality research. The creation of research networks such as the SPLIT Research Group facilitates collaboration and data collection. Subgroups within the network such as the FOG allow for enhanced analysis of data collected.

Teasing out whether disparities truly exist in the academic achievement of transplant recipients is an important first step in optimizing outcomes. Previous studies have shown that liver transplant patients suffer lower quality of life (QOL) in comparison to age-matched controls. In comparison to cancer patients, liver transplant recipients fared better on physical QOL assessments, but equally on social and school indicators.\(^3,4\) In addition, younger patients are perceived by their parents as having better emotional well-being in comparison to school-aged children.\(^1\)

The investigators for the current study also aimed to identify factors associated with increased risk of deficits. The results suggest that improved preoperative nutritional status, increased support for single-parent households or families with lower education levels, and decreasing the volume of blood transfusion intraoperatively may help to optimize long-term outcomes. It is yet to be seen if early intervention would improve outcomes, but it does seem to be an appropriate first step.

References

Key words: neurocognitive outcome, liver transplant, chronic disease
Investigators from multiple institutions sought to determine if body mass index (BMI) is a valid measure of obesity in children and adolescents. For the study, the investigators conducted a meta-analysis. Relevant articles between 1950-2013 were retrieved from multiple databases. Studies were included if they met the following criteria: (1) assessment of diagnostic performance of BMI in children aged 0-18 for obesity, (2) inclusion of 2x2 data tables, and (3) a reference standard for assessing body fat percentage. BMI measurements were classified as indicative of obesity based on published standards (eg, ≥95th percentile for age). Similarly, specific criteria were used to classify body fat percentages as indicative of obesity. The sensitivity and specificity of BMI measurements as a test for obesity when compared to the reference standard (body fat percentage measurements) were calculated. Researchers also calculated a “diagnostic odds ratio” (DOR), defined as the odds of a positive test (BMI measurement) in a person with disease (ie, classified as obese by body fat percentage measurement) divided by the odds of a positive test in a person without disease.*

A total of 1,488 potential studies were identified. Of those, 37 were selected for inclusion, comprising 53,521 patients aged 4-18 years (22,781 females and 18,429 males in studies with gender-specific data). Meta-analysis yielded a pooled sensitivity for BMI to detect obesity of 0.73 (95% CI, 0.67-0.79) and pooled specificity of 0.93 (95% CI, 0.88-0.96). Separated by sex, BMI in males showed pooled sensitivity of 0.67 (95% CI, 0.56-0.76) and specificity of 0.94 (95% CI, 0.84-0.98) while in females, the pooled sensitivity was 0.71 (95% CI, 0.62-0.79) and specificity 0.95 (95% CI, 0.88-0.98). For the total sample population, the DOR was 36.93, meaning that children with a high BMI had approximately a 37-fold increased odds of having high adiposity based on body fat percentage; for males the DOR = 31.37 and females = 48.02.

The authors conclude that BMI has high specificity in identifying obesity in children and adolescents. But with a sensitivity of 0.73, they conclude that over one fourth of pediatric patients screened as “normal” in body composition may in fact have excess body fat that can lead to significant medical issues later in life, thus heralding the need for reliable office-based adiposity measurement.

**PICO**

**Question:** Does body mass index reliably predict obesity in children and adolescents when compared to more definitive techniques for measuring adiposity?

**Question type:** Diagnosis

**Study design:** Meta-analysis

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**Is BMI Reliably Predictive of Obesity in Children?**


**Commentary by** Shelley Springer, MD, MBA, MSc, JD, Big Lake, MN

Dr. Springer has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Obesity is one of the major public health issues of today, and our pediatric patients are not immune. BMI is the moniker well known for denoting abnormal weight status, and, despite inherent flaws, is used as an important clinical marker for obesity in all age groups. Calculation of BMI is simple, utilizing only weight (kg) and height (cm), and the results presume that an elevated BMI represents increased body fat without regard to lean body mass, bony structure, growth spurts, and other body composition issues. With their meta-analysis, the investigators of the current study have compared BMI with more rigorous body fat analytics such as dual energy X-ray absorptiometry, hydrostatic weighing, air-displacement plethysmography, isotope dilution, bioelectrical impedance analysis, and skin-fold thickness measurement. Their pooled analysis of 53,521 patients reveals that, as a screening test, BMI is not very good. The best screening test has few false negatives (FN), so no one is missed (high sensitivity) (see Weighing the Evidence, AAP Ground Rounds, June 2003;9[6]:65). With a specificity (true negatives [TN]/TN+FP) of 0.93, false positives are rare: if the BMI says your patient is abnormal anthropometrically, they probably are. But with a sensitivity (TP/[TP+FN]) of 0.73, “false negatives,” patients with “normal” BMI, may already have excess body fat (so-called “normal weight obesity”). Therefore, reliance solely on BMI to define obesity may result in under-diagnosis at a crucial period when intervention could make a difference.

This meta-analysis identifies the urgent need for adiposity norms for our pediatric patients, and a convenient, reliable diagnostic approach that can be integrated into routine health surveillance visits in the office setting.

**Key words:** obesity, body mass index, adiposity

*See “Weighing the Evidence” discussion of diagnostic odds ratios on Page 48.

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CME OBJECTIVES

• Describe the association of early adolescent pseudopromise behavior with subsequent peer relationships, substance abuse, and criminal behaviors
• Understand the efficacy of metronidazole for Dientamoeba fragilis infection
• Describe the risk of developing celiac disease for children with susceptible HLA haplotypes

1. Which of the following is the most accurate statement regarding the results of the study by Otten et al and the impact of legislation on child nutrition?
   a. 78% of the respondents were aware of the ordinance following implementation
   b. Awareness of the ordinance increased over time
   c. Both restaurant chains changed their menus to meet ordinance-specific nutrition criteria
   d. Calories in children’s meals did decrease across the study period
   e. Following enactment of the ordinance, the majority of those surveyed chose not to purchase the toy

2. A 12-month-old girl presents with a 1-week history of rhinorrhea and a mild cough that has worsened to include intermittent paroxysms of many rapid coughs. In between episodes, the patient looks well. A nasopharyngeal swab is positive for Bordetella pertussis by PCR. Since she received DTaP at 2, 4, and 6 months of age, what is the most likely description of this patient’s disease course compared to an unimmunized child based on the study by Barlow et al?
   a. A longer duration of cough
   b. Decreased likelihood of hospitalization and shorter duration of cough
   c. Decreased likelihood of hospitalization but no significant difference for cough duration
   d. Increased risk of apnea
   e. Increased risk of secondary bacterial pneumonia

3. A 13-year-old girl presents for her well-adolescent appointment. During her confidential visit, she discloses that she has kissed several boyfriends over the last year and is friends with the popular good-looking kids 2 grades ahead of her. Which of the following statements is most accurate based on the study by Allen et al?
   a. She is at decreased risk of having future problems with alcohol
   b. She is at decreased risk of having future problems with marijuana use
   c. She is at increased risk of having difficulty forming meaningful friendships in young adulthood
   d. She is at lower risk of criminal behaviors in young adulthood
   e. She is more likely to be popular than her peers by age 15 years

4. A 10-year-old boy presents in August with a 4-week history of diffuse abdominal pain and loose, foul-smelling stools. He is afebrile and his physical examination is normal. Stool examination reveals trophozoites and real-time PCR is positive for Dientamoeba fragilis. Based on the study by Röser et al, which of the following is the most accurate statement regarding the efficacy of metronidazole for the treatment of D fragilis infection in children?
   a. Metronidazole, as compared to placebo, significantly decreased the frequency of abdominal pain episodes
   b. Metronidazole, as compared to placebo, was associated with a shorter time to attainment of formed stools
   c. Metronidazole therapy eradicated D fragilis infection in the majority of children but this effect was often transient
   d. Metronidazole was efficacious for sustained eradication of D fragilis infection
   e. Sixty percent of children had vomiting associated with taking metronidazole and were not able to complete the prescribed 10-day course of therapy

5. Based on the study by Liu et al, which of the following is the most accurate statement concerning the risk of developing celiac disease (CD) in children with susceptible HLA haplotypes?
   a. 40% of genetically susceptible individuals will develop CD
   b. Female gender was associated with a decreased risk of CD
   c. Having a first degree relative with celiac disease was not associated with an increased risk of CD
   d. Homozygous HLA DR3-DQ2 genotype is associated with a lower cumulative risk of developing CD
   e. Residence in Sweden was independently associated with a higher risk of CD

6. A 10-year-old boy with hypoplastic left heart syndrome has undergone multiple surgeries including a Norwood procedure at 5 days, a bidirectional Glenn procedure at 5 months, and a Fontan procedure at 3 years of age. In addition to his surgical procedures he has had over 10 diagnostic and interventional cardiac catheterization procedures and approximately 100 chest x-rays. His family asks about his risk of developing cancer because of his previous procedures. Based on the study by Johnson et al, which of the following is the most appropriate response?
   a. Likely lower than the general population
   b. Likely the same as the general population
   c. Higher than if he was a girl with hypoplastic left heart syndrome
   d. Most affected by radiation exposure from his cardiac catheterization procedures
   e. Most affected by radiation exposure from his number of chest x-rays

7. A 13-month-old boy is diagnosed with bilateral acute otitis media (AOM) and prescribed a 10-day course of amoxicillin. The mother asks about complementary therapies. Which of the following is the most accurate conclusion of the study by Steele et al concerning osteopathic manipulative treatment (OMT) and its effect on subsequent middle ear effusion (MEE) resolution?
   a. Participants were not randomly assigned to study groups so the results were not valid
   b. Results suggested a higher resolution of MEE with OMT at 2 weeks but the validity of the results were possibly skewed by not having a sham manipulation group and a significant number of uninterpretable tympanograms and acoustic reflectometer readings that were excluded from analysis
   c. The results of the study are not valid since the diagnosis of AOM was not standardized
   d. The study showed a significant benefit of OMT on reducing the number of children who needed tympanostomy tubes
   e. The study showed a significantly faster resolution of ear pain with OMT

8. A 4-month-old, previously healthy boy is admitted to the hospital for difficulty breathing, an oxygen saturation of 88% on room air, and a diagnosis of bronchiolitis. His temperature is 103.2°F. A nasopharyngeal sample is positive for RSV antigen. Based on the study by Kakarachchi et al, which of the following is the most accurate statement?
   a. He has a 7% probability of having a concomitant urinary tract infection (UTI) with an abnormal renal ultrasound based on the AAP’s 2011 criteria
   b. He is more likely to be diagnosed with a concomitant UTI based on the AAP’s 2011 criteria as compared to the AAP’s 1999 criteria
   c. His probability of having pyuria on urinalysis is 33%
   d. His risk of having a UTI based on the AAP’s 2011 criteria is low (1.1%)
   e. The height of his fever places him at a risk of UTI of >10%

9. A 5-year-old girl with a history of biliary atresia and liver transplantation 3 years ago is seen for a health maintenance examination. The parents are married and both attended college. Her weight Z-score at the time of transplant was more than 2 standard deviations below the mean and her height Z-score was 1 standard deviation below the mean. Based on the study by Sorenson et al, which of the following factors places her at greatest risk for having a below-average full scale IQ (FSIQ)?
   a. 2-parent household
   b. Female sex
   c. Height at time of transplant
   d. Parent education level
   e. Weight at time of transplant

10. A 14-year-old boy comes into your office for a preparticipation sports physical. He hopes to play tackle on the school football team, and has been trying to put on weight. You identify lack of pubertal developments (Tanner I). The patient weighs 140 lbs and is 5’7” tall. BMI = 21.9 (80th percentile). According to the article by Javed et al, which of the following is the most accurate statement?
    a. Although the patient may appear overweight, there is no need for concern as his growth spurt will extinguish any body habitus concerns
    b. Because the patient’s BMI is in the normal range, he does not need any nutritional or dietary counseling
    c. BMI has a high sensitivity (0.95) to determine increased adiposity and obesity
    d. BMI has a low specificity (0.70) for determining obesity
e. Despite his reassuring BMI, he could already be accumulating excess body fat that could negatively impact his future health

Answers:
1. e
2. b
3. c
4. e
5. b
6. a
7. e
8. c
9. b
10. e

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Revisiting the Best Interest Standard in Pediatric Decision-Making

by Felipe E. Vizcarrondo MD, MA, FAAP, Section on Bioethics

Dr Vizcarrondo has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Respecting an individual’s autonomy has become an overarching obligation in medical decision-making. In pediatrics, however, children are not autonomous individuals, since the right to self-determination – the core of autonomy – depends on cognitive, psychological, and social skills that children have yet to develop. For this reason, we rely on parents or legal guardians to act as the child’s surrogate and to abide by standards for surrogate decision-making. The most commonly used standard is the best interest standard: what is in the best interest of the child is determined by the surrogate calculating the benefits and burdens of a procedure or course of treatment with the goal of attaining the greatest benefit and least burden.

Salter characterizes the best interest standard practiced today as one that primarily focuses on weighing the benefits and burdens relevant to the child only and not those benefits and burdens relative to others, such as parents and family. Although this focus on the individual stresses the development of the child’s autonomy, it also requires parents to conceive of the child’s interests as separate from their interests. Salter states that the latter is unrealistic.

WEIGHING THE EVIDENCE

Summarizing Tests Across Multiple Studies: The Diagnostic Odds Ratio

by Daniel R. Neuspiel, MD, MPH, FAAP

When comparing diagnostic tests across multiple studies, such as the meta-analysis by Javed et al in this issue, it is useful to have a summary statistic that indicates the diagnostic accuracy of the test. In a single number, the diagnostic odds ratio (DOR) describes how much higher the odds are of getting a positive test result in an affected person compared to one without the condition.

The DOR is defined by the equation below, where LR+ is positive likelihood ratio and LR− is negative likelihood ratio (see Weighing the Evidence, AAP Grand Rounds, December 2005;14(6):62):

DOR = LR+ / LR−

In the study by Javed et al, the investigators sought to determine if body mass index (BMI) reliably predicts obesity in children and adolescents when compared to other techniques for measuring adiposity. In their entire study population, the DOR was 36.93 (95% CI, 20.75-65.71); for males the DOR was 31.37 (95% CI, 11.53-85.31), and for females the DOR was 48.02 (95% CI, 21.09-109.4).

Salter asserts that the best interest standard ought to include consideration of benefits and burdens not only to the child but also to those on whom the child is dependent. Since a child cannot be sufficiently isolated from the influence of parents and family, Salter argues we ought not employ a standard for pediatric decision-making that considers the child as an isolated individual. She calls for including relationships and relational interests when making decisions for children.

Salter proposes 4 specific questions to be asked when considering a plan of care for a child: What are the likely consequences of the course of treatment on the child’s ability to (1) communicate with others, (2) engage physically with others, and (3) play or interact with others, and finally, (4) where and by whom will the child be cared for? She claims the language of rights and the rules derived from the principle of autonomy do have a place in pediatric decision-making, but are best placed in the context of setting the boundaries for state intervention. She proposes to call these the “basic” interests of the child, a public standard minimum threshold of care, below which the state is justified in intervening. Salter’s call to expand the best interest standard in pediatric medical decision-making to include the relational interests of children would conform more closely to reality, enhance ethical deliberation, and may result in better outcomes for the child and the family.

Reference