Scanning the Literature

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Adolescent Obesity Leads to Diabetes

Sinha R, Fisch G, Teague B, et al. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. N Engl J Med 2002; 346:802-810.

Background: Childhood obesity, epidemic in the United States, has been accompanied by an increase in the prevalence of type 2 diabetes among children and adolescents. We determined the prevalence of impaired glucose tolerance in a multiethnic cohort of 167 obese children and adolescents. **Methods**: All subjects underwent a two-hour oral glucose-tolerance test (1.75 g [corrected] of glucose per kilogram of body weight), and glucose, insulin, and C-peptide levels were measured. Fasting levels of proinsulin were obtained, and the ratio of proinsulin to insulin was calculated. Insulin resistance was estimated by homeostatic model assessment, and beta-cell function was estimated by calculating the ratio between the changes in the insulin level and the glucose level during the first 30 minutes after the ingestion of glucose. **Results**: Impaired glucose tolerance was detected in 25 percent of the 55 obese children (4 to 10 years of age) and 21 percent of the 112 obese adolescents (11 to 18 years of age); silent type 2 diabetes was identified in 4 percent of the obese adolescents. Insulin and C-peptide levels were markedly elevated after the glucose-tolerance test in subjects with impaired glucose tolerance but not in adolescents with diabetes, who had a reduced ratio of the 30-minute change in the insulin level to the 30-minute change in the glucose level. After the body-mass index had been controlled for, insulin resistance was greater in the affected cohort and was the best predictor of impaired glucose tolerance. **Conclusions**: Impaired glucose tolerance is highly prevalent among children and adolescents with severe obesity, irrespective of ethnic group. Impaired oral glucose tolerance was associated with insulin resistance while beta-cell function was still relatively preserved. Overt type 2 diabetes was linked to beta-cell failure.

Comments: This article is a wake-up call for all physicians who treat children. Obesity is an epidemic in the United States. To see patients who are 20-30 pounds overweight is not uncommon in a pediatric practice. We know well that it is easier to treat a patient with an asthmatic crisis than to manage an obese child successfully.

The prevalence of impaired glucose tolerance tests found by the authors is high; 25% of 55 children and 21% of 112 adolescents. Type II diabetes mellitus is becoming more common among children and adolescents (Rosenbloom et al. Diabetes Care 1999; 22:345-354). I personally diagnosed a few cases in the first half of 2002. This article teaches us to suspect it more often in obese children. Of interest is the fact that fasting blood sugars did not detect those with an abnormal glucose tolerance test or hyperinsulinemia.

More studies are needed to evaluate and design protocols that are effective in managing this difficult problem. Childhood obesity requires a community effort to curtail fast foods and junk food advertising on children's prime time TV and to increase awareness of the dangers of sedentary pastimes like video and computer games and TV. On the other hand, insurance companies should be ready to cover such preventive services as weight reduction programs and visits to the dietician; otherwise we will be paying the higher cost of diabetic complications in the future. A cost/benefit analysis comparing these two would be helpful.

Childhood Obesity Demands Physician Vigilance

Barlow SE, Dietz WH, Klish WJ, et al. Medical evaluation of overweight children and adolescents: reports from pediatricians, pediatric nurse practitioners, and registered dietitians. Pediatrics 2002 ; 110(1 Pt 2):222-228.

Objective: The primary aim of this study was to determine how pediatric health care providers identify overweight in children and adolescents and how they evaluate obesity-related medical complications. This information can guide development of programs to help providers improve their evaluation practices.

A secondary objective was to examine the association of certain provider characteristics with recommended evaluation practices. **Methods**: A random sample of pediatricians, pediatric nurse practitioners (PNPs), and registered dietitians received a questionnaire about their evaluation of overweight children and adolescents. Results were compared with published recommendations. Associations between respondent characteristics and adherence to published recommendations were examined. **Results**: A total 940 providers responded (response rate: 19%-33%). Among all 3 groups a majority frequently used clinical impression, weight-for-age percentile, weight-for-height percent, and weight-for-height percentile to assess degree of overweight. Nearly all pediatricians and PNPs routinely evaluated blood pressure, but a minority routinely looked for orthopedic problems, insulin resistance, and sleep disorders. Less than 10% followed all recommendations for history and physical examination. Two thirds of pediatricians and PNPs routinely tested for lipid abnormalities. Most providers asked about family history of overweight, hypertension, cardiovascular disease, and diabetes, but only one third asked about gallbladder disease. In general, the provider's specialty, years in practice, gender, and body mass index were not associated with adherence to recommended practices. **Conclusions**: Medical evaluation of overweight children and adolescents fell short of recommended practices. These results point to the need for educational efforts to increase awareness of medical risks and for tools to facilitate more complete evaluation during office visits.

Comments: We are not evaluating obese children appropriately. As the incidence of childhood obesity increases, it is very important to follow the recommendations set for the evaluation of these patients (see www.pediatrics.org/cgi/content/full/102/3/e29 for expert committee recommendations).

The new growth charts were published by the CDC in the year 2000. These not only have revisions to the weight, height, and head circumference, but also include the addition of Body Mass Index (BMI). The BMI helps evaluate the patient's weight in relation to height and monitors the children who are at risk for obesity. The BMI is more accurate than weight to age, which is the method commonly used.

Once the child is diagnosed, it is important to recognize the complications of the disease. About 20%-30% of 5-11 year old obese children have high blood pressure; 10%-30% have high amino transferase, suggesting steatosis. Type II diabetes now accounts for as much as 45% of new diagnoses of diabetes mellitus according to the American Diabetic Association. Other complications are slipped capital femoral epiphysis, Blount's disease, obstructive apnea, and obesity type hypoventilation syndrome. Careful history taking and physical examinations should identify the possible presence of any of these conditions.

Concrete Advice for Improving Pediatric Asthma Outcomes

Lara M, Rosenbaum S, Rachelefsky G, et al. Improving childhood asthma outcomes in the United States: a blueprint for policy action. Pediatrics 2002; 109:919-930.

Background/Objective: Asthma is increasingly being recognized as an important public health concern for children in the United States. Effective management of childhood asthma may require not only improving guideline-based therapeutic interventions, but also addressing social and physical environmental risk factors. The objective of this project was to create a blueprint for improvement of national policy in this area. **Design/Methods**: A nominal group process with nationally recognized experts and leaders (referred to as "the committee") in childhood asthma. **Results**: The committee identified 11 policy recommendations (numbered in order below) in 2 broad categories: Improving Health Care Delivery and Financing, and Strengthening the Public Health Infrastructure. Recommendations regarding Improving Health Care Delivery and Financing include the development and implementation of quality-of-care standards in 1) primary care, 2) self-management education, and 3) case-management interventions, and the expansion of insurance coverage and benefit design by 4) extending continuous health insurance coverage for all children, 5) developing model insurance benefits packages for essential childhood asthma services, and 6) educating health care purchasers in how to use them. Recommendations for Strengthening the Public Health Infrastructure include public funding of asthma services that fall outside the insurance system through establishing 7) public health grants to foster asthma-friendly communities and 8) school-based asthma initiatives. 9) Launching a national asthma public education campaign, 10) developing a national asthma surveillance system, and 11) establishing a national agenda for asthma prevention research,

with an emphasis on epidemiologic and behavioral sciences, are also recommended. **Conclusions**: Implementing these recommendations will require coordination of activities at the national, state, and local community level, and within and outside the health care delivery system. With a further commitment of national and local resources, implementation of these recommendations will likely lead to improved child and family asthma outcomes in the United States. childhood asthma, health care policy, health care services.

Comments: This article represents an outstanding group of recommendations that definitely will make a difference in the management and outcome of childhood asthma. Some of the recommendations are set forth below.

1. *Develop and implement primary care performance measures for childhood asthma.* This will enhance diagnosis and treatment. Unfortunately, there are still physicians who have not read, or are not following, the asthma guidelines published by the National Asthma Education Prevention Program in 1992, and revised in 1997.
2. *Teach all children with persistent asthma a specific set of self-management skills.* Education is the key to understanding this disease and following recommendations. Education should be extended to all people involved in the care of the child, such as the immediate family, baby sitters and day care center workers.
3. *Provide case management to high-risk children.*
4. *Extend continuous health insurance coverage to all uninsured children.* Ideal.
5. *Develop model benefit package for essential childhood asthma services.* This means peak flow meters and spacers will be covered regardless of the type of insurance coverage. In addition, one will be able to purchase state of the art, safer medicines based on the patient's needs rather than insurance coverage.
6. *Educate health care purchasers about asthma benefits.* Knowing what type of insurance coverage is the most comprehensive and covers asthma benefits is important for health insurance purchasers. Parents should ask their insurance agents or Human Resource Administrators for written confirmation and explanation of asthma coverage policies when comparing.
7. *Establish public health grants to further asthma-friendly communities and home environment.*
8. *Promote asthma-friendly schools and school-based asthma programs.* Children spend a lot of time in school. Some schools are apprehensive about the students using any type of medicine, especially when unsupervised. This lack of knowledge about asthma adds to the morbidity and even mortality of the disease.
9. *Launch a national asthma public education campaign.*
10. *Develop a national asthma surveillance system.*
11. *Develop and implement a national agenda for asthma prevention research.* The national agenda for asthma prevention research should include environmental monitoring through coordinated effort by the EPA and FDA. More research is needed on the effects of different chemical emissions and asthma. Research is also needed in the area of food additives and asthma – finding alternative additives that are less prone to develop and exacerbate asthma in susceptible individuals.

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Lung Cancer Screening—the Search Continues

Diederich S, Wormanns D, Semik M, et al. Screening for early lung cancer with low-dose spiral CT: prevalence in 817 asymptomatic smokers.
Radiology 2002; 222: 773-781.

Purpose: To present prevalence screening data from a nonrandomized screening trial by using low-dose computed tomography (CT) and a simple algorithm based on the size and attenuation of detected nodules to guide diagnostic work-up. **Materials and Methods**: Eight hundred seventeen asymptomatic volunteers (age range, 40–78 years; median age, 53 years; median tobacco consumption, 45 pack-years) underwent spiral low-dose CT of the chest without contrast material enhancement. We regarded all noncalcified pulmonary nodules greater than 10 mm in diameter as potentially malignant and recommended histologic examination or follow-up after 3, 6, 12, and 24 months to exclude growth. For noncalcified pulmonary nodules of 10 mm or smaller, repeat low-dose CT was recommended to exclude growth. **Results**: In 43% (350 of 817) of individuals, 858 noncalcified pulmonary nodules were found. Thirty-two nodules in 29 subjects were larger than 10 mm. Biopsy of 15 lesions revealed lung cancer in 12 lesions in 11 subjects (prevalence for all ages, 1.3% [11 of 817 subjects]; >50 years of age, 2.1% [11 of 519 subjects]; >60 years of age, 3.9% [eight of 206 subjects]), with a high proportion of early tumor stages (seven tumors, stage I; two, stage II; and three, stage III); three lesions were benign. In 17 nodules larger than 10 mm, follow-up with low-dose CT for a minimum of 24 months did not demonstrate growth. **Conclusion**: Lung cancer screening with low-dose CT demonstrated a prevalence of asymptomatic cancers in 1.3% of a smoking population, including a high proportion of early tumor stages and a 20% (three of 15) rate of invasive procedures for benign lesions.

Comments: Although lung cancer is the leading cause of death due to malignancy in the US, an appropriate screening test to detect early lung cancer has yet to be elucidated. This article examines the feasibility of using a low-dose spiral CT protocol to detect lung cancer in asymptomatic smokers. Important considerations include cost/benefit analysis, risk/benefit ratio, avoidance of interventional procedures in patients with benign lesions, and improvement in mortality rate. Risks of CT primarily relate to radiation exposure, as a noncontrast enhanced CT protocol was utilized. The authors of the article estimate that, using the described protocol, cancer would be induced in three men and six women per 100,000 examinations. The monetary cost continues to be significantly higher than chest radiography; however, in this study 92% of detected cancers were resectable compared with 51% in the Mayo Lung Project, which examined Chest radiography as a screening tool. Twenty percent of the biopsied lesions were benign. The diagnostic algorithm used to select follow-up was largely subjective and presented an opportunity for bias. Additionally, only one radiologist interpreted the CT scans. Although it appears that CT may be able to detect lung cancer in early stages in asymptomatic patients, it has yet to be determined if this will translate into a decrease in mortality. As technology improves, opportunities for faster scans at lower doses with more accurate characterization of lesions may make lung cancer screening a standard clinical practice in the future; however, further studies are needed to assess the appropriateness of CT as a screening tool.

Treatment of Intermittent Claudication

de Bries SO, Visser K, de Vries JA, et al. Intermittent claudication: cost-effectiveness of revascularization versus exercise therapy.
Radiology 2002; 222: 25-36.

Purpose: To compare the costs, effectiveness, and cost-effectiveness of alternative treatment strategies for intermittent claudication. **Materials and Methods**: By combining data from the literature and original patient data, a Markov decision model was developed to evaluate the societal cost-effectiveness. Patients presented with previously untreated intermittent claudication, and treatment options were exercise, percutaneous transluminal angioplasty (with stent placement, if necessary), and/or bypass surgery. Treatment strategies were defined as the initial therapy in combination with secondary treatment options should the initial therapy fail. The main outcome measures were quality-adjusted life days, expected lifetime costs (in 1995 U.S. dollars), and incremental cost-effectiveness ratios. **Results**: Compared with an exercise program, revascularization (either angioplasty or bypass surgery) improved effectiveness by 33–61 quality-adjusted life days among patients with no history of coronary artery disease. The incremental cost-effectiveness ratio was $38,000 per quality-adjusted life year gained when angioplasty was performed whenever feasible, as compared with exercise alone, and $311,000 with additional bypass surgery. The

incremental cost-effectiveness ratios were sensitive to age, history of coronary artery disease, estimated health values for no or mild claudication versus severe claudication, and revascularization costs. **Conclusion**: The results suggest that, on average, the expected gain in effectiveness achieved with bypass surgery for intermittent claudication is small compared with the costs. Angioplasty performed whenever feasible was more effective than was exercise alone, and the cost-effectiveness ratio was within the generally accepted range.

Comments: According to this article, few patients with intermittent claudication progress to limb threatening symptoms; however, the quality of life of these patients is certainly affected. This review evaluated various treatment strategies including bypass surgery, exercise, and percutaneous revascularization techniques for cost effectiveness with consideration of improvement in quality of life. Morbidity/mortality and costs associated with surgery were thought to outweigh the potential gain. Exercise therapy is plagued with issues of patient compliance, and the number of symptomatic days endured prior to improvement due to therapy affects quality of life. The authors concluded that angioplasty presented low pre- and post-procedure morbidity, was more effective than exercise alone, and offered a reasonable cost-effectiveness ratio. This study did not include smoking cessation as a factor. There were also opportunities for bias as statistical comparisons of risks, benefits, and costs were based on the results of other studies. Although this study does have limitations, it raises the possibility of percutaneous revascularization as a first line therapy for intermittent claudication.

Can PET Imaging Diagnose Alzheimer's Disease?

Silverman DHS, Small GW, Chang CY, et al. Positron emission tomography in evaluation of dementia. Regional brain metabolism and long-term outcome.
JAMA 2001; 286: 2120-2127.

Context: Deficits in cerebral glucose utilization have been identified in patients with cognitive dysfunction attributed to various disease processes, but their prognostic and diagnostic value remains to be defined. **Objective**: To assess the sensitivity and specificity with which cerebral metabolic patterns at a single point in time forecast subsequent documentation of progressive dementia. **Design, Setting, and Patients**: Positron emission tomography (PET) studies of [18F]fluorodeoxyglucose in 146 patients undergoing evaluation for dementia with at least 2 years' follow-up for disease progression at the University of California, Los Angeles, from 1991 to 2000, and PET studies in 138 patients undergoing evaluation for dementia at an international consortium of facilities, with histopathological diagnoses an average of 2.9 years later, conducted from 1984 to 2000. **Main Outcome Measures**: Regional distribution of [18F]fluorodeoxyglucose in each patient, classified by criteria established a priori as positive or negative for presence of a progressive neurodegenerative disease in general and of Alzheimer disease (AD) specifically, compared with results of longitudinal or neuropathologic analyses. **Results**: Progressive dementia was detected by PET with a sensitivity of 93% (191/206) and a specificity of 76% (59/78). Among patients with neuropathologically based diagnoses, PET identified patients with AD and patients with any neurodegenerative disease with a sensitivity of 94% and specificities of 73% and 78%, respectively. The negative likelihood ratio of experiencing a progressive vs nonprogressive course over the several years following a single negative brain PET scan was 0.10 (95% confidence interval, 0.06-0.16), and the initial pattern of cerebral metabolism was significantly associated with the subsequent course of progression overall ($P<.001$). **Conclusion**: In patients presenting with cognitive symptoms of dementia, regional brain metabolism was a sensitive indicator of AD and of neurodegenerative disease in general. A negative PET scan indicated that pathologic progression of cognitive impairment during the mean 3-year follow-up was unlikely to occur.

Comments: Dementia and, more specifically, Alzheimer's Disease (AD), is a significant cause of morbidity and mortality among America's geriatric population. According to this article, an estimated 4 million Americans are affected by AD with costs approaching $70 billion. Diagnosis of the disease and assessment of the clinical course in early stages would optimize the treatment and management of affected patients. PET imaging as a means of diagnosing AD has been studied for many years; however, an accurate assessment of its sensitivity and specificity has been difficult to elucidate. This study used a reasonably large sample size of 284 to examine not only the ability of PET to establish a correct diagnosis, but also its ability to

predict the clinical course. The results suggest that PET is a sensitive method of diagnosing AD and predicting progression of dementia; however, the specificities are only 73% and 76%, respectively. The clinical utility of PET in the diagnosis of AD has not yet been determined. These results indicate that a negative scan offers reassurance, but a positive scan does not indicate certain progression of dementia. PET imaging for the evaluation of dementia may be an important diagnostic tool in the future.

Triage of Postmenopausal Patients With Abnormal Vaginal Bleeding

Medverd JR, Dubinsky TJ. Cost analysis model: US versus endometrial biopsy in evaluation of peri- and postmenopausal abnormal vaginal bleeding. Radiology 2002; 222: 619-627.

Purpose: To develop a cost minimization analysis model from the societal perspective of Medicare reimbursement to determine whether endometrial biopsy or transvaginal ultrasonography (US) is less expensive in evaluating peri- and postmenopausal women with abnormal vaginal bleeding and to assess whether this strategy is equally effective in populations at low and high risk for endometrial carcinoma. **Materials and Methods**: Clinical algorithms were constructed that detailed diagnostic evaluation of the target population by using office-based endometrial biopsy versus transvaginal US as starting points. An economic model based on Medicare reimbursement and average wholesale drug price data and using disease prevalences and modality sensitivities from the scientific literature was then created to examine common bleeding causes in this population. All models included the cost of obtaining a tissue diagnosis for focal or diffuse endometrial thickening found at US. Modality sensitivities and prevalences of disease states were varied within the model to discover limits at which each modality became cheaper versus the other for assessing a population of women. **Results**: Population prevalence of neoplastic disease is the principal factor governing total cost between competing diagnostic algorithms. In populations with 31% or less combined prevalence of endometrial carcinoma/atypical adenomatous hyperplasia, algorithms utilizing transvaginal US as the initial test are most cost minimizing. At combined endometrial carcinoma/atypical adenomatous hyperplasia prevalence of 10%, savings of up to 11% and 16% over pathways initiated with endometrial biopsy are predicted. In populations with a high incidence of neoplastic disease (>31%), biopsy-based algorithms should become least costly. **Conclusion**: Transvaginal US–initiated triage predicts substantial cost savings versus biopsy-based algorithms in evaluating typical populations of peri- and postmenopausal women with abnormal vaginal bleeding seen in clinical practice.

Comments: According to this article, most causes of postmenopausal bleeding are benign; however, bleeding is the presenting symptom of endometrial cancer in 80%-85% of cases. The authors examined six algorithm models to determine whether transvaginal ultrasound (US) as a triage examination resulted in cost savings. Prevalence of disease and sensitivity values were based on studies in the current literature. Four models used US as a triage examination and two models used blind endometrial biopsy. Numerous assumptions were made as outlined in the article. Cost savings, not cost effectiveness, was examined. The results indicate that triage with US offers overall cost savings when all causes of abnormal are considered; however, biopsy remains the most efficient for the diagnosis of malignancy (the minority of cases). Complications and costs relating to delay in diagnosis were not considered. The authors used sensitivity values of US that were lower than many published values, and used the higher published sensitivities for biopsy. While the study has limitations, the authors suggest that US as a triage examination may offer societal cost savings in the evaluation of abnormal vaginal bleeding in postmenopausal bleeding.

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