Asthma News This Week

April 15, 2019

CONTENTS

JOURNAL articles

Booster, G.D., Orland, A.A., and B.G. Bender. Treatment Adherence in Young Children with Asthma. Immunology and Allergy Clinics of North America. May 2019; 39(2): 233-242. DOI: 10.1016/j.iac.2018.12.006

Treatment nonadherence in young children with asthma involves multiple factors and should be viewed within an ecological framework. Few interventions have targeted multiple bidirectional factors, however, and little research has examined which interventions may be most appropriate for young children. Additional research is needed to identify essential intervention components,

and to determine how to sustain such interventions in at-risk communities. **Pediatric psychologists, with training in psychosocial intervention, screening, and primary prevention models, may be uniquely equipped to partner with communities and medical settings to develop and sustain targeted interventions for young children with asthma**.

Kwong, C.G. and L. B. Bacharier. Management of Asthma in the Preschool Child. *Immunology and Allergy Clinics of North America.* **May 2019; 39(2): 177-190. doi: 10.1016/j.iac.2018.12.003.**

The management of asthma in the preschool population is challenging because disease phenotypes are heterogeneous and evolving. Available therapies aimed at preventing persistent symptoms and recurrent exacerbations include inhaled corticosteroids and leukotriene receptor antagonists; episodic use of inhaled corticosteroids and azithromycin may result in a decrease in exacerbations among children with intermittent disease. This article reviews an approach using patient characteristics for selecting initial treatment approaches based on disease phenotype, such as symptom patterns or evidence of atopic markers. Evidence for and against the use of oral corticosteroids during acute episodes and barriers to adherence and effective treatment are discussed.

Achakulwisut, Pattanun, et al. Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO2 pollution: estimates from global datasets. *The Lancet Planetary Health.* **April 2019. DOI:https://doi.org/10.1016/S2542-5196(19)30046-4**

Background: Paediatric asthma incidence is associated with exposure to traffic-related air pollution (TRAP), but the TRAP-attributable burden remains poorly quantified. Nitrogen dioxide (NO_2) is a major component and common proxy of TRAP. In this study, we estimated the annual global number of new paediatric asthma cases attributable to NO_2 exposure at a resolution sufficient to resolve intra-urban exposure gradients. Methods: We obtained 2015 country-specific and age-group-specific asthma incidence rates from the Institute for Health Metrics and Evaluation for 194 countries and 2015 population counts at a spatial resolution of 250×250 m from the Global Human Settlement population grid. We used 2010–12 annual average surface NO_2 concentrations derived from land-use regression at a resolution of 100×100 m, and we derived concentration-response functions from relative risk estimates reported in a multinational meta-analysis. We then estimated the NO_2-attributable burden of asthma incidence in children aged 1–18 years in 194 countries and 125 major cities at a resolution of 250×250 m. Findings: Globally, we estimated that 4·0 million (95% uncertainty interval [UI] 1·8–5·2) new paediatric asthma cases could be attributable to NO_2 pollution annually; 64% of these occur in urban centres. This burden accounts for 13% (6–16) of global incidence. Regionally, the greatest burdens of new asthma cases associated with NO_2 exposure per 100 000 children were estimated for Andean Latin America (340 cases per year, 95% UI 150–440), high-income North America (310, 140–400), and high-income Asia Pacific (300, 140–370). Within cities, the greatest burdens of new asthma cases associated with NO_2 exposure per 100 000 children were estimated for Lima, Peru (690 cases per year, 95% UI 330–870); Shanghai, China (650, 340–770); and Bogota, Colombia (580, 270–730). **Among 125 major cities, the percentage of new asthma cases attributable to NO_2 pollution ranged from 5·6% (95% UI 2·4–7·4) in Orlu, Nigeria,**

to 48% (25–57) in Shanghai, China. This contribution exceeded 20% of new asthma cases in 92 cities. **We estimated that about 92% of paediatric asthma incidence attributable to NO2 exposure occurred in areas with annual average NO2 concentrations lower than the WHO guideline of 21 parts per billion**. Interpretation: Efforts to reduce NO2 exposure could help prevent a substantial portion of new paediatric asthma cases in both developed and developing countries, and especially in urban areas. Traffic emissions should be a target for exposure-mitigation strategies. The adequacy of the WHO guideline for ambient NO2 concentrations might need to be revisited.

Ajdacic-Gross, Vladeta, et al. A step beyond the hygiene hypothesis—immune-mediated classes determined in a population-based study. *BMC Medicine.* **April 2019; 17(75). doi: 10.1186/s12916-019-1311-z**

BACKGROUND: Comorbidity patterns of childhood infections, atopic diseases, and adverse childhood experiences (ACE) are related to immune system programming conditions. The aim of this study was to make a step beyond the hygiene hypothesis and to comprehensively classify these patterns with latent class analysis (LCA). A second aim was to characterize the classes by associations with immunological, clinical, and sociodemographic variables. METHODS: LCA was applied to data from the CoLaus|PsyCoLaus study (N = 4874, age range 35-82 years) separately for men and women. It was based on survey information on chickenpox, measles, mumps, rubella, herpes simplex, pertussis, scarlet fever, hay fever, asthma, eczema, urticaria, drug allergy, interparental violence, parental maltreatment, and trauma in early childhood. Subsequently, we examined how immune-mediated classes were reflected in leukocyte counts, inflammatory markers (IL-1β, IL-6, TNF-α, hsCRP), chronic inflammatory diseases, and mental disorders, and how they differed across social classes and birth cohorts. RESULTS: LCA results with five classes were selected for further analysis. Latent classes were similar in both sexes and were labeled according to their associations as neutral, resilient, atopic, mixed (comprising infectious and atopic diseases), and ACE class. They came across with specific differences in biomarker levels. Mental disorders typically displayed increased lifetime prevalence rates in the atopic, the mixed, and the ACE classes, and decreased rates in the resilient class. The same patterns were apparent in chronic inflammatory diseases, except that the ACE class was relevant specifically in women but not in men. CONCLUSIONS: This is the first study to systematically determine immune-mediated classes that evolve early in life. They display characteristic associations with biomarker levels and somatic and psychiatric diseases occurring later in life. Moreover, they show different distributions across social classes and allow to better understand the mechanisms beyond the changes in the prevalence of chronic somatic and psychiatric diseases.

Ramsey, R.R., et al. A Systematic Evaluation of Asthma Management Apps Examining Behavior Change Techniques. *Journal of Allergy and Clinical Immunology Practice.* **April 2019. pii: S2213-2198(19)30326-5. doi: 10.1016/j.jaip.2019.03.041.**

BACKGROUND: Mobile health (mHealth) apps have the potential to facilitate asthma self-management by including medication reminders, allowing self-monitoring of symptoms, improving access and quality of information communicated with provider, and providing

educational resources to patients and parents. Many apps exist for asthma management, however, the extent to which apps include evidence-based behavior change strategies has not been examined. OBJECTIVE: To review the content and quality of mHealth asthma management apps that are available to patients. METHODS: Asthma apps were identified using a systematic search process. Twenty-three apps were coded for presence or absence of **behavior change techniques (BCTs)** using the taxonomy of behavior change techniques as defined by Abraham & Michie [1]. Quality ratings were also determined for each app using the Mobile App Rating Scale (MARS). RESULTS: The number of BCTs each app utilized ranged from 1-11 (M = 4). **BCTs that were most commonly used were instruction, behavior-health link, self-monitoring, feedback, teach to use prompts/cues, consequences, and others' approval**. Overall app quality based on MARS scores ranged from 2.45-4.50 (M = 3.32). **Two apps, KissmyAsthma and AsthmaMD, utilized at least eight BCTs and had high quality ratings.** CONCLUSION: KissmyAsthma and AsthmaMD utilized at least eight BCTs and had good quality scores.

Fallon, M., et al. A Group Visit for High-Risk Pediatric Asthma Patients: A Quality Improvement Initiative to Improve Asthma Care. *Clinical Pediatrics.* April 2019; 9922819839238. doi: 10.1177/0009922819839238.

INTRODUCTION: Asthma disproportionately affects poor and minority children. Limited parental knowledge and confidence in asthma management, as well as stress from chronic illness, may contribute to poor outcomes. Novel approaches for providing care are essential for this vulnerable population. Our objective was to evaluate the feasibility and impact of an asthma group visit for high-risk children. METHODS: Our primary care practice cares for more than 2600 children with asthma. The majority have public insurance. Children classified as high risk ($\geq$1 asthma-related emergency department visit/hospitalization in the preceding 2 years) were eligible. Children received brief physical examinations, medication review, and updated Asthma Action Plans. Educational sessions were held for children and parents. Pre and post surveys were used to assess parents' experience and changes in confidence in asthma management. RESULTS: Twenty children and their parents participated. **Mean parent confidence scores (5-point Likert-type scale, 5 indicating greatest confidence) improved in managing their child's asthma symptoms (3.60, 4.40, P $\leq$ .005), managing their child's asthma medications (3.85, 4.30, P $\leq$ .005), using their child's Asthma Action Plan (3.79, 4.45, P $\leq$ .02), communicating with the school about their child's food allergies (4.32, 4.72, P $\leq$ .03), and helping their child relax to reduce emotional triggers of asthma** (3.25, 4.47, P $\leq$ .01). All families reported that they would return to a group visit. CONCLUSION: Group visits are feasible for providing care, education, and peer support to a vulnerable population. Parents expressed satisfaction and improved confidence in aspects of asthma management. Group visits have the potential to improve asthma outcomes for high-risk families.

Johnson, J., et al. Home Smoke Exposure and Health-Related Quality of Life in Children with Acute Respiratory Illness. *Journal of Hospital Medicine.* April 2019; 14(4):212-217. doi: 10.12788/jhm.3164.

OBJECTIVE: This study aims to assess whether secondhand smoke (SHS) exposure has an impact on health-related quality of life (HRQOL) in children with acute respiratory illness (ARI). METHODS: This study was nested within a multicenter, prospective cohort study of children (two weeks to 16 years) with ARI (emergency department visits for croup and hospitalizations for croup, asthma, bronchiolitis, and pneumonia) between July 1, 2014 and June 30, 2016. Subjects were surveyed upon enrollment for sociodemographics, healthcare utilization, home SHS exposure (0 or ≥1 smoker in the home), and child HRQOL (Pediatric Quality of Life Physical Functioning Scale) for both baseline health (preceding illness) and acute illness (on admission). Data on insurance status and medical complexity were collected from the Pediatric Hospital Information System database. Multivariable linear mixed regression models examined associations between SHS exposure and HRQOL. RESULTS: **Home SHS exposure was reported in 728 (32%) of the 2,309 included children. Compared with nonexposed children, SHS-exposed children had significantly lower HRQOL scores for baseline health** (mean difference -3.04 [95% CI -4.34, -1.74]) and acute illness (-2.16 [-4.22, -0.10]). Associations were strongest among children living with two or more smokers. HRQOL scores were lower among SHS-exposed children for all four conditions but only significant at baseline for bronchiolitis (-2.94 [-5.0, -0.89]) and pneumonia (-4.13 [-6.82, -1.44]) and on admission for croup (-5.71 [-10.67, -0.75]). CONCLUSIONS: Our study demonstrates an association between regular SHS exposure and decreased HRQOL with a dose-dependent response for children with ARI, providing further evidence of the negative impact of SHS.

Lim, E., et al. Effect of Sociodemographics, Health-Related Problems, and Family Structure on Chronic Absenteeism Among Children. *Journal of School Health.* **April 2019; 89(4):308-318. doi: 10.1111/josh.12736.**

BACKGROUND: From 5 to 7.5 million schoolchildren are chronically absent, defined as missing ≥15 days of school within a year. Students miss schools due to various reasons such as health, socioeconomic status, and environmental factors. We examined child's health and behavior, family structure, and sociodemographics to understand chronic absenteeism. METHODS: The population included children ages 6 to 17 years from the Medical Expenditure Panel Survey years 2008-2013. Multivariable logistic regressions were used to identify the risk factors of chronic absenteeism, adjusting for the complex sampling design. RESULTS: Among sociodemographic variables, age ≥14 years, race/ethnicity, lower-income family, public health insurance, US born, and speaking English at home were associated with absenteeism. Asians, Mexican Hispanics, and blacks have lower absenteeism than whites. Among health-related variables, children using an inhaler for asthma, having behavioral problems, and less healthy than other children were more likely to be chronically absent. Among family variables, a smaller family size was a risk factor for absenteeism. CONCLUSIONS: Asthma and behavioral problems were highly associated with chronic absenteeism. The identification of children at risk for chronic absenteeism will help the educational professionals identify the barriers to academic achievements and develop integrated educational interventions and policies to support disadvantaged children.

Mosnaim, G.S., et al. Design and baseline characteristics of a low-income urban cohort of children with asthma: The Asthma Action at Erie Trial. *Contemporary Clinical Trials.* **April 2019; 79:55-65. doi: 10.1016/j.cct.2019.02.006.**

OBJECTIVE: To describe the methodology of **a randomized controlled trial comparing the efficacy of integrated asthma community health workers (CHW) and a certified asthma educator (AE-C) to improve asthma outcomes in low-income minority children in Chicago.** METHODS: Child/caregiver dyads were randomized to CHW home visits or education in the clinic from an AE-C. Intervention was delivered in the first year after enrollment. Data collection occured at baseline, 6-, 12-, 18, and 24-months. The co-primary outcomes included asthma control using the Asthma Control Test/childhood Asthma Control Test (ACT/cACT) and activity limitation over the past 14 days. RESULTS: A total of 223 participants ages 5-16 years were randomized. The majority of children were in the 5-11 year old range (78.9%). Most caregivers (96.9%) and 44% of children were female. Approximately 85% of caregivers and children reported Hispanic ethnicity and 62.3% reported a household income of ≤ $59,000. Over half (55.7%) had uncontrolled asthma as measured by ACT/cACT; 13.9% had a normal ACT/cACT score but were uncontrolled using the Asthma Control Questionnaire and 20.2% were controlled on both measures but had received oral steroids in the past year for asthma. CONCLUSION: **The Asthma Action at Erie Trial successfully recruited a largely Hispanic cohort of children with uncontrolled or high-risk asthma to study the differential effects of clinic-based AE-C and home-based CHW interventions.** Strengths of the trial include its comparative effectivness design that integrates interventionists and intervention delivery into a clinical setting. Categorizing asthma control in community settings for research purposes presents unique challenges. CLINICAL TRIAL REGISTRATION: University of Illinois at Chicago Protocol Record R01HL123797, Asthma Action at Erie TrialClinicalTrials.gov Identifier: NCT02481986 "ClinicalTrials.gov Registration" register@clinicaltrials.gov.

Saglani, Sejal, et al. Biologics for paediatric severe asthma: trick or TREAT? *Lancet Respiratory Medicine.* **April 2019; 7(4): 294-296.**

To address the age discrimination against children in the UK, we have united as a paediatric respiratory community to undertake a clinical trial funded by the UK National Institute for Health Research. We will use a unified clinical protocol that includes at least 8 weeks of electronic adherence monitoring before randomisation. The so-called Treating severe paediatric asthma; **a randomised trial of mepolizumab and omalizumab (TREAT) trial will compare the efficacy of omalizumab and mepolizumab in children with STRA. This is a non-inferiority trial for 52 weeks, with asthma attacks as the primary outcome, but we will also investigate biomarkers of response in children**… Importantly, we will aim to demonstrate the advantages of specialist paediatric severe asthma centres and thereby encourage childhood STRA to also be commissioned as a specialist service.

In the NEWS

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