Asthma News This Week

Childhood Asthma Leadership Coalition

Jan 31, 2020

CONTENTS

JOURNAL articles

Raymond Parlar-Chun and Kristen Arnold, Association of Various Weight Based Doses of Continuous Albuterol on Hospital Length of Stay, (2020) *Journal of Asthma,* 1-9, DOI: 10.1080/02770903.2020.1723622

Introduction: Continuous albuterol is a mainstay in management of pediatric status asthmaticus. While the National Heart Lung and Blood Institute Asthma Guidelines **suggest 0.5 mg/kg/hr as**

the recommended dosage, there is a paucity of evidence comparing different weight based rates on hospital outcomes. **Methods:** Patients requiring continuous albuterol for asthma exacerbation from January 2015 to December 2016 were identified using ICD codes. The concentration of albuterol (5 mg/h - 20 mg/h) and the duration of treatment were used to determine total albuterol administration. After dividing by patient weight, average weight based doses were divided into equal quintiles. Unadjusted and length of stay adjusted for age, initial asthma severity score, and administration of magnesium were compared among the quintiles. The same multivariate analysis was used for duration of continuous albuterol. **Results:** 533 hospitalizations for asthma were identified of which 289 received continuous albuterol. Weight based dosage quintiles ranged from lowest (0.07 - 0.29 mg/kg/hr) to the highest (>0.76 - 3.2 mg/kg/hr). Baseline characteristics were similar aside from age, race, and magnesium administration**. There was no difference in adjusted length of stay or adjusted duration of continuous albuterol therapy among the five quintiles**. **Conclusion:** No optimal weight based dose of continuous albuterol was found. **Further investigation is needed to see if lower amounts of continuous albuterol may be as efficacious as higher doses**. This could improve cost of status asthmaticus management and limit the number of adverse events associated with high exposure to continuous albuterol.

Ricardo A. Mosquera, et al., Unexpected Results of a Randomized Quality Improvement Program for Children With Severe Asthma, (2020) *Journal of Asthma,* **1-12, DOI: 10.1080/02770903.2020.1723621**

Objective: To assess whether an asthma intervention program reduces treatment days outside the home among children with severe asthma receiving comprehensive care (CC) in our center. **Methods:** Between October 21, 2014 and September 28, 2016, children with severe asthma were randomized to receive CC alone (n = 29) or **CC plus the asthma intervention program (n = 34) which involved collaboration with pharmacists and school nurses, motivational interviewing, and tracking the one-second forced expiratory volume at home**. All patients were followed through March 31, 2017. Frequentist and Bayesian intent-to-treat analyses were performed. **Results:** The asthma intervention program doubled the telephone calls between the staff and families (753 vs 356 per 100 child years for the intervention group vs. control group; Rate Ratio [RR], 2.11 [95% confidence interval, 1.29-3.45]). Yet, **we found no evidence that it reduced the composite number of days of healthcare outside home which includes, clinic visits, ED visits, and hospital admissions** (1179 vs 958 per 100 child-years in the intervention group vs. control group; [RR], 1.23 [95% CI, 0.82-1.84]) **or secondary outcomes which are individual components (clinic visits, ED visits, hospitalizations, PICU admissions and school absences**; RR 1.15 - 2.30; p > 0.05). Bayesian analysis indicated a 67% probability that the intervention program increases total treatment days outside the home and only a 14% probability of a true decrease of >20% as originally hypothesized. **Conclusion:** A multi-component intervention program provided to children with severe asthma failed to reduce and may have increased days of healthcare outside home and school absenteeism.

Kedir N. Turi, et al., Dose, Timing, and Spectrum of Prenatal Antibiotic Exposure and Risk of Childhood Asthma, **(2020)** *Clinical Infectious Disease,* **DOI: 10.1093/cid/ciaa085**

Background: The potential for prenatal antibiotic exposure to influence asthma risk is not clear. We aim to determine the effect of timing, dose, and spectrum of prenatal antibiotic exposure on the risk of childhood asthma. **Methods:** We conducted a population-based cohort study of 84,214 mother-child dyads to examine the association of prenatal antibiotic exposure and childhood asthma using multivariable logistic regression models. **Results: Sixty-four percent of pregnant women received antibiotics. Prenatal antibiotic exposure was associated dose-dependently with increased odds of childhood asthma** (adjusted odds ratio [aOR] for interquartile increase of 2 courses [0, 2]: 1.26, 95% confidence interval [95%CI]: 1.20, 1.33). Among children exposed to at least one course in utero, the effect of timing at the first course was moderated by total maternal courses. Among pregnant women receiving a single antibiotic course, **timing of exposure had no effect on childhood asthma risk**. **Among women receiving more than one course, early exposure of the first course was associated with greater childhood asthma risk**. Compared to narrow-spectrum only antibiotic use, **broad-spectrum only antibiotic exposure was associated with increased odds of asthma** (aOR: 1.14, 95%CI: 1.05,1.24). There were effect modifications (p<0.001) by maternal asthma on total courses, and on timing of the first course, significant only among those without maternal asthma. **Conclusions: Increased cumulative dose, early pregnancy first course, and broad-spectrum antibiotic exposure were associated with childhood asthma risk**. Our study provides important evidence supporting judicious prenatal antibiotic use, particularly timing of use and choice of antibiotics, in preventing subsequent childhood asthma.

Background: Global gene expression levels are known to be highly dependent upon gross demographic features including age, yet identification of age-related genomic indicators has yet to be comprehensively undertaken in a disease and treatment-specific context. **Methods:** We used gene expression data from CD4+ lymphocytes in the Asthma BioRepository for Integrative Genomic Exploration (Asthma BRIDGE), an open-access collection of subjects participating in genetic studies of asthma with available gene expression data. **Replication population participants were Puerto Rico islanders** recruited as part of the ongoing Genes environments & Admixture in Latino Americans (GALA II), who provided nasal brushings for transcript sequencing. The main outcome measure was chronic asthma control as derived by questionnaires. Genomic associations were performed using regression of chronic asthma control score on gene expression with age in years as a covariate, including a multiplicative interaction term for gene expression times age. **Results: The SMARCD1 gene** (SWI/SNF-related matrix-associated actin-dependent regulator of chromatin subfamily D member 1) **interacted with age to influence chronic asthma control on inhaled corticosteroids, with a doubling of expression leading to an increase of 1.3 units of chronic asthma control per year** (95% CI [0.86, 1.74], $p = 6 \times 10^{-9}$), suggesting worsening asthma control with increasing age. This result replicated in GALA II ($p = 3.8 \times 10^{-8}$). Cellular assays confirmed the role of SMARCD1 in glucocorticoid response in airway epithelial cells. **Conclusion:** Focusing on age-dependent factors may help identify novel indicators of asthma medication response. **Age appears to modulate the effect of SMARCD1 on asthma control with inhaled corticosteroids**.

Geetha M. Warhrer, et al., Disease Burden of Adverse Childhood Experiences Across 14 States, (2020) *PLoS One,* **15(1): e0226134, DOI:** 10.1371/journal.pone.0226134

Objective: To examine whether the relationship between Adverse Childhood Experiences (ACEs) and health outcomes is similar across states and persists net of ACEs associations with smoking, heavy drinking, and obesity. **Methods:** We use data from the Behavioral Risk Factor Surveillance System for 14 states. Logistic regressions yield estimates of the direct associations of ACEs exposure with health outcomes net of health risk factors, and indirect ACEs-health associations via health risk factors. Models were estimated for California (N = 22,475) and pooled data from 13 states (N = 110,076), and also separately by state. **Results:** Exposure to ACEs is associated with significantly higher odds of smoking, heavy drinking, and obesity. Net of these health risk factors, **there was a significant and graded relationship in California and the pooled 13-state data between greater ACEs exposure and odds of depression, asthma, COPD, arthritis, and cardiovascular disease**. Four or more ACEs were less consistently associated across states with cancer and diabetes and a dose-response relationship was also not present. There was a wide range across individual states in the percentage change in health outcomes predicted for exposure to 4+ ACEs. ACEs-related smoking, heavy drinking, and obesity explain a large and significant proportion of 4+ ACEs associations with COPD and cardiovascular disease, however some effect, absent of risk behavior, remained. **Conclusions: ACE's associations with most of the health conditions persist independent of behavioral pathways but only asthma, arthritis, COPD, cardiovascular disease, and depression consistently exhibit a dose-response relationship**. Our results suggest that attention to child maltreatment and household dysfunction, mental health treatment, substance abuse prevention and promotion of physical activity and healthy weight outcomes might mitigate some adverse health consequences of ACEs. Differences across states in the pattern of ACEs-health associations may also indicate fruitful areas for prevention.

Mayra P. Martinez, et al., Maternal Gestational Diabetes and Type 2 Diabetes During Pregnancy and Risk of Childhood Asthma in Offspring, (2020) *Journal of Pediatrics,* **DOI:** 10.1016/j.jpeds.2019.12.053

Objective: To examine maternal preexisting type 2 diabetes (T2D) and gestational diabetes mellitus (GDM) on risk of childhood asthma. **Study design:** This retrospective birth cohort study included **97 554 singletons born in 2007-2011 within hospitals from a single integrated healthcare system**. Children were prospectively followed from age 5 until December 31, 2017, using electronic medical records. Relative risks of childhood asthma associated with maternal diabetes in utero were estimated by hazard ratios using Cox regression adjusting for potential confounders. **Results:** There were 3119 children (3.2%) who were exposed to preexisting T2D and 9836 (10.1%) to GDM. Among mothers with GDM, 3380 (34.4%) were dispensed antidiabetic medication during pregnancy. During a median of 7.6 years (IQR, 6.3-9.0 years) after birth, 15 125 children (15.5%) were diagnosed with asthma after age 5. Maternal diabetes interacted with maternal asthma history to affect child's asthma risk (P = .05). **Among children without maternal asthma (n = 89 487), the adjusted hazard ratios for childhood asthma were 1.21 (95% CI, 1.08-1.36; P < .001) for exposure to T2D, 1.12 (95% CI, 1.01-1.25; P = .04) for GDM requiring antidiabetic medications, and 1.01 (95% CI, 0.93-1.10; P = .82) for GDM not requiring medications compared with no diabetes during pregnancy**. The

corresponding hazard ratios were 1.53 (95% CI, 1.19-1.96; P < .001), 1.11 (95% CI, 0.65-1.46; P = .44), and 0.84 (95% CI, 0.66-1.08; P = .17) among children without maternal asthma (n = 8067). Gestational age at GDM diagnosis was not associated with childhood asthma (P = .27). **Conclusions: The risk of childhood asthma was predominately observed for exposure to preexisting T2D, small for GDM requiring medication, and not increased for GDM not requiring medication during pregnancy, compared with no diabetes during pregnancy**.

Timothy E. Dribin, et al., Are Children With a History of Asthma More Likely to Have Severe Anaphylactic Reactions? A Retrospective Cohort Study, (2020) *Journal of Pediatrics,* **DOI: 10.1016/j.jpeds.2019.12.019**

Objective: To assess whether a history of asthma was associated with anaphylaxis severity in children hospitalized for anaphylaxis. **Study design:** Retrospective cohort study of children ≤21 years old hospitalized for anaphylaxis from 2009 to 2016. The primary outcome was severe anaphylactic reactions defined by examination findings (stridor, respiratory distress, or hypotension) or administered therapies (≥2 dose of intramuscular epinephrine, continuous albuterol, vasopressors, or positive pressure ventilation). Multivariable analyses were used to assess whether a history of asthma was associated with severe anaphylactic reactions, adjusting for patient age, allergen, and history of atopic dermatitis or anaphylaxis. **Results: Among 603 children hospitalized for anaphylaxis, 231 (38.3%) had a history of asthma. Children with a history of asthma were older** (median age, 6.6 years [IQR, 3.6-12.1] vs 4.0 years [IQR, 1.6-9.3]), **more likely to have a history of anaphylaxis** (38.1% vs 18.0%), and have food as the inciting allergen (68.0% vs 52.2%). Children with a history of asthma were not more likely to have severe anaphylactic reactions (OR, 0.97; 95% CI, 0.67-1.39). **Conclusions:** Children hospitalized for anaphylaxis with a history of asthma were not more likely to have severe anaphylactic reactions compared with children without asthma. This study supports managing children with anaphylaxis based on the severity of symptomatology, and, if validated, clinicians should not consider asthma comorbidity as a stand-alone criterion for hospitalization.

Nanae Tsuchiya, et al., Safety of Repeated Hyperpolarized Helium 3 Magnetic Resonance Imaging in Pediatric Asthma Patients, (2020) *Pediatric Radiology,* **DOI: [10.1007/s00247-019-04604-0](10.1007/s00247-019-04604-0)**

Background: Hyperpolarized helium 3 magnetic resonance imaging (^{3}He MRI) is useful for investigating pulmonary physiology of pediatric asthma, but a detailed assessment of the safety profile of this agent has not been performed in children. **Objective:** To evaluate the safety of ^{3}He MRI in children and adolescents with asthma. **Materials and methods:** This was a retrospective observational study. ^{3}He MRI was performed in 66 pediatric patients (mean age 12.9 years, range 8-18 years, 38 male, 28 female) between 2007 and 2017. Fifty-five patients received a single repeated examination and five received two repeated examinations. We assessed a total of 127 ^{3}He MRI exams. Heart rate, respiratory rate and pulse oximetry measured oxygen saturation (SpO_2) were recorded before, during (2 min and 5 min after gas inhalation) and 1 h after MRI. Blood pressure was obtained before and after MRI. Any subjective symptoms were also noted. Changes in vital signs were tested for significance during the exam and divided into three subject age groups (8-12 years, 13-15 years, 16-18 years) using linear mixed-effects models. **Results:** There were no serious adverse events, but three minor adverse events (2.3%; headache, dizziness

and mild hypoxia) were reported. We found statistically significant increases in heart rate and SpO_2 after ^{3}He MRI. The youngest age group (8-12 years) had an increased heart rate and a decreased respiratory rate at 2 min and 5 min after ^{3}H inhalation, and an increased SpO_2 post MRI. **Conclusion: The use of ^{3}He MRI is safe in children and adolescents with asthma**.

Amanda J. Driscoll, et al., Does Respiratory Syncytial Virus Lower Respiratory Illness in Early Life Cause Recurrent Wheeze of Early Childhood and Asthma? Critical Review of the Evidence and Guidance for Future Studies From a World Health Organization-sponsored Meeting, (2020) *Vaccine,* **DOI:** 10.1016/j.vaccine.2020.01.020

Respiratory syncytial virus (RSV) is a leading cause of lower respiratory tract infection (LRTI) and hospitalization in infants and children globally. Many observational studies have found an association between RSV LRTI in early life and subsequent respiratory morbidity, including recurrent wheeze of early childhood (RWEC) and asthma. Conversely, two randomized placebo-controlled trials of efficacious anti-RSV monoclonal antibodies (mAbs) in heterogenous infant populations found no difference in physician-diagnosed RWEC or asthma by treatment group. If a causal association exists and RSV vaccines and mAbs can prevent a substantial fraction of RWEC/asthma, the full public health value of these interventions would markedly increase. The primary alternative interpretation of the observational data is that RSV LRTI in early life is a marker of an underlying predisposition for the development of RWEC and asthma. If this is the case, RSV vaccines and mAbs would not necessarily be expected to impact these outcomes. To evaluate whether the available evidence supports a causal association between RSV LRTI and RWEC/asthma and to provide guidance for future studies, the World Health Organization convened a meeting of subject matter experts on February 12-13, 2019 in Geneva, Switzerland. After discussing relevant background information and reviewing the current epidemiologic evidence, the group determined that: (i) **the evidence is inconclusive in establishing a causal association between RSV LRTI and RWEC/asthma**, (ii) the evidence does not establish that RSV mAbs (and, by extension, future vaccines) will have a substantial effect on these outcomes and (iii) **regardless of the association with long-term childhood respiratory morbidity, severe acute RSV disease in young children poses a substantial public health burden** and should continue to be the primary consideration for policy-setting bodies deliberating on RSV vaccine and mAb recommendations. Nonetheless, the group recognized the public health importance of resolving this question and suggested good practice guidelines for future studies.

Sigmund J. Kharasch, et al. The Use of Point-of-Care Ultrasound to Evaluate Pulsus Paradoxus in Children With Asthma, (2020), *Journal of Ultrasound Medicine,* **DOI:** [10.1002/jum.15226](10.1002/jum.15226)

Pulsus paradoxus (PP) is defined as a fall of systolic blood pressure of greater than 10 mm Hg during the inspiratory phase of respiration. Measurement of PP is recommended by national and international asthma guidelines as an objective measure of asthma severity but is rarely used in clinical practice. Cardiac point-of-care ultrasound with pulsed wave Doppler imaging measuring respiratory-phasic changes of mitral valve inflow velocities is well described in cardiac tamponade as "sonographic" PP. **We present 10 cases of acute asthma presenting to an**

emergency department showing the finding of sonographic determined PP in the apical 4-chamber view of the heart on pulsed wave Doppler imaging.

Ayşe Kılıç, et al., Mechanical Forces Induce an Asthma Gene Signature in Healthy Airway Epithelial Cells, (2020) *Scientific Reports,* **10(1): 966, DOI:** [10.1038/s41598-020-57755-8](https://doi.org/10.1038/s41598-020-57755-8)

Bronchospasm compresses the bronchial epithelium, and this compressive stress has been implicated in asthma pathogenesis. However, the molecular mechanisms by which this compressive stress alters pathways relevant to disease are not well understood. Using air-liquid interface cultures of primary human bronchial epithelial cells derived from non-asthmatic donors and asthmatic donors, we applied a compressive stress and then used a network approach to map resulting changes in the molecular interactome. In cells from non-asthmatic donors, compression by itself was sufficient to induce inflammatory, late repair, and fibrotic pathways. Remarkably, this molecular profile of non-asthmatic cells after compression recapitulated the profile of asthmatic cells before compression. **Together, these results show that even in the absence of any inflammatory stimulus, mechanical compression alone is sufficient to induce an asthma-like molecular signature.**

Nakia C. Best, et al., An Appraisal of School Nurse Health Services and Programs in North Carolina Public Schools, 2006-2016, (2020) *Journal of School Nurses,* **1059840519899439, DOI:** [10.1177/1059840519899439](https://doi.org/10.1177/1059840519899439)

School nurses are instrumental in delivering health services to children in schools. This study addresses the gap in school nurse health services data, examining patterns in health services and programs provided by school nurses between 2006 and 2016 for students in North Carolina public schools. This study focused on services and programs related to asthma and diabetes, two health conditions that affect millions of children in the United States. Over 1.46 million children attend North Carolina public schools. In 2006, the average school nurse-to-student ratio was 1:1,340. By 2016, the average school nurse-to-student ratio decreased to 1:1,086, a 19% improvement. Over the 10-year study time period, **there were statistically significant increases in the rate of occurrence of all health conditions that students received health services for ($p < .001$), asthma ($p < .001$),** type I diabetes ($p = .0003$), orders for all health-care procedures ($p = .01$), all school nurse-led health counseling ($p = .004$), and diabetes health counseling ($p < .01$).

Pasquale Comeriati, et al., Lung Mechanical Properties Distinguish Children With Asthma With Normal and Diminished Lung Function, (2020) *Clinical and Experimental Allergy,* **DOI:** [10.1111/cea.13573](https://doi.org/10.1111/cea.13573)

Background: Children with asthma, even those with severe persistent disease, can have forced expiratory volume in 1 second (FEV_1) values ≥100% of predicted, while others have diminished FEV_1. **Objective:** We sought to characterize the lung mechanical properties underlying these two asthma phenotypes and the mechanisms explaining the paradox of severe asthmatic children, whom when clinically stable can have an FEV_1 >100% of predicted, but during an acute bronchospastic episode can experience a life-threatening asthma event. **Methods:** Lung mechanics were evaluated in three groups of children: asthmatics with FEV_1 ≥100% ($HFEV_1$; n =13), asthmatics with FEV_1 ≤80% ($LFEV_1$; n =14), and non-asthmatic controls (n=10). A linear

mixed model was used to examine the relationship between volume and static transpulmonary pressures obtained at total lung capacity (TLC); actual TLC % predicted and flow; and static transpulmonary pressure and flow. **Results:** $HFEV_1$ asthmatics had larger airways (FEV_1 z-scores 1.12 vs. -2.37; $p<0.05$), greater lung volumes (mean % predicted TLC 134.8 vs. 109.6%; $p<0.05$) and lower airway resistance (mean % predicted Raw 101.9 vs. 199.9%; $p<0.05$) compared to the $LFEV_1$ group. Moreover, $HFEV_1$ asthmatics had significantly reduced elastic recoil pressure (pressure-volume curve shifted upward and to the left) and higher lung compliance (0.21 vs. 00.9 $L/cm\ H_2O$; $p < 0.05$) compared to the $LFEV_1$ group. The pressure-flow curves revealed the $LFEV_1$ group to have significantly increased resistance to flow in the upstream segment of the airways at all lung volumes studied compared to $HFEV_1$. **Conclusion and clinical relevance: $HFEV_1$ asthmatic children display distinct lung mechanical proprieties compared to their $LFEV_1$ asthmatic peers**. With loss of elastic recoil pressure, the $HFEV_1$ group could generate normal FEV_1 due to proportionally enlarged airways and reduced airway resistance, while airflow limitation in the $LFEV_1$ is due to increased airway resistance. Loss of elastic recoil and interdependence during acute bronchoconstriction episodes may predispose the $HFEV_1$ group to catastrophic reductions in airflow.

Alexandra Sitarik, et al., Racial Disparities in Allergic Outcomes Persist to Age 10 Years in Black and White Children, (2020) *Annals of Allergy, Asthma, and Immunology,* **DOI: 10.1016/j.anai.2020.01.001**

Background: Previous analyses in the WHEALS birth cohort demonstrated black children are more likely to experience allergic outcomes than white children by age 2 years. The results could not be explained by a host of variables. **Objective:** Assess whether racial disparities persisted to age 10 years and determine whether any differences could be explained by a panel of variables related to early life exposures in WHEALS. **Methods:** At age 10 years, WHEALS children (n=481) completed skin prick testing, spirometry and methacholine challenge and a physician exam for eczema and asthma. Allergen-specific IgEs (sIgE) and total IgE were measured. Inverse probability weighting with logistic and linear regression models was used to assess associations between race (black or white) and the outcomes. **Results:** Black children fared worse than white children with respect to each outcome. **Black children were more likely to have eczema, asthma, sensitization** ($\geq$1 sIgE$\geq$0.35 IU/L) and at least one positive skin pick test; however, some variability was present in the magnitudes of association within subgroups defined by delivery mode, sex of the child, prenatal indoor dog exposure, and firstborn status. In some subgroups, **Black children were also more likely to have higher total IgE and worse pulmonary function test measures** (PC 20 $\leq$25 mg/ml, % predicted FVC, FEV1/FVC, FEF 25-75). Confounding did not explain these differences. **Conclusion:** Racial differences persisted in this cohort through age 10 years. Future studies should include potentially important, but rarely studied factors such as segregation and structural racism as these factors could explain the observed racial differences.

Maria Baquero, et al., Health Behaviors and Outcomes Associated With Personal and Family History of Criminal Justice System Involvement, New York City, 2017, (2020) *American Journal of Public Health,* **e1-e7, DOI: 10.2105/AJPH.2019.305415**

Objectives: To quantify the association between personal and family history of criminal justice system (CJS) involvement (PHJI and FHJI, respectively), health outcomes, and health-related behaviors. **Methods:** We examined 2017 New York City Community Health Survey data (n = 10 005) with multivariable logistic regression. We defined PHJI as ever incarcerated or under probation or parole. FHJI was CJS involvement of spouse or partner, child, sibling, or parent. **Results:** We found that 8.9% reported only FHJI, 5.4% only PHJI, and 2.9% both FHJI and PHJI (mean age = 45.4 years). Compared with no CJS involvement, individuals with only FHJI were more likely to report fair or poor health, hypertension, diabetes, obesity, depression, heavy drinking, and binge drinking. **Respondents with only PHJI reported more fair or poor health, asthma, depression, heavy drinking, and binge drinking. Those with both FHJI and PHJI were more likely to report asthma, depression, heavy drinking, and binge drinking**. **Conclusions:** New York City adults with personal or family CJS involvement, or both, were more likely to report adverse health outcomes and behaviors. **Public Health Implications:** Measuring CJS involvement in public health monitoring systems can help to identify important health needs, guiding the provision of health care and resource allocation.

Heather Hoch De Keyser, Rachelle Ramsey, and Monica J. Federico, They Just Don't Take Their Medicines: Reframing Medication Adherence in Asthma From Frustration to Opportunity, (2020), *Pediatric Pulmonology,* **DOI: 10.1002/ppul.24643**

Assessing and addressing suboptimal adherence to asthma medications is a key component in the treatment of all children with asthma, particularly those with difficult-to-treat asthma. However, parents often overreport adherence to asthma medications. Increased medication adherence could lead to improved outcomes in the form of better asthma control and decreased asthma exacerbations, as well as decreased healthcare utilization costs. Yet there are many complex factors that affect medication adherence, and barriers are often different in each family. Social determinants of health, complex healthcare relationships, and patient-related factors may all affect medication adherence. **Multicomponent patient-centered strategies, as well as strategies that utilize technology and habit formation strategies may be helpful in improving medication adherence.** Further study is needed to reliably and sustainably improve medication adherence in children with asthma across the broader population; in some populations, alternate diagnoses, adjusting therapy, and other intervention may be required to improve asthma control and health.

Huong Q. McLean, et al., Serious Outcomes of Medically Attended, Laboratory-Confirmed Influenza Illness Among School-Aged Children With and Without Asthma, 2007-2018 (2020) *Influenza and Other Respiratory Viruses,* **DOI: 10.1111/irv.12710**

Background: Asthma was associated with influenza hospitalizations in children during the 2009 pandemic, but it is unclear if asthma is associated with serious illness during seasonal epidemics. Little is known regarding the effect of vaccination on influenza severity in children with asthma. **Methods:** Children aged 5-17 years in a community cohort presenting with acute respiratory illness were prospectively enrolled and tested for influenza from 2007-08 through 2017-18 (excluding the 2009-10 pandemic season). Data from the electronic health record were extracted to determine asthma status and serious outcomes associated with influenza infection. A serious

outcome was defined as hospitalization, emergency department visit, and/or pneumonia diagnosis within 30 days of symptom onset. Multivariable logistic regression models were used to assess asthma status and effect of vaccination on odds of a serious outcome. **Results:** One thousand seven hundred and sixty four medically-attended influenza infections among school-aged children were included. Asthma was confirmed in 287 (16%) children. **A serious influenza-associated outcome occurred in 104 (6%) children. The odds of a serious outcome did not differ between those with confirmed asthma and those without asthma** [adjusted odds ratio (aOR): 1.35, 95% confidence interval (CI): (0.77-2.35), P = .3]. The effect of vaccination on serious outcomes was not modified by asthma status [aOR for children without asthma: 0.55 (95% CI: 0.28-1.07), children with asthma: 1.39 (95% CI: 0.53-3.69); interaction P-value = .12]. **Conclusions: Asthma was not a risk factor for serious illness among children with influenza**. Additional studies are needed to better understand the role of influenza vaccination in preventing serious outcomes among children with asthma.

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