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Ellen Adelia Doebler
University of North Dakota

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Increased Incidence of Asthma after Previous Infantile RSV Bronchiolitis Infection

Doebler, Ellen Adelia

Physician Assistant Program, University of North Dakota School of Medicine & Health Sciences
Grand Forks, ND 58012-9037 www.med.und.nodak.edu

Abstract

- Respiratory Syncytial Virus (RSV) is a very common infection in children less than two years of age.
- Asthma is a common respiratory disease in childhood, which may cause frequent hospitalizations.
- The purpose of this study is to determine if infants previously diagnosed with RSV bronchiolitis have an increased incidence of asthma diagnosis compared to infants not diagnosed with RSV.
- The literature review examines correlation studies of both disease processes and explores incidence of asthma in patients previously diagnosed with Respiratory Syncytial Virus bronchiolitis.
- Individuals previously diagnosed with Respiratory Syncytial Virus bronchiolitis have a higher risk of developing asthma than individuals undiagnosed with this disease.
- The findings indicate that health care providers need to provide education to patients and parents about increased incidence of asthma and provide symptomatic recommendations to improve patient outcomes and reduce risk of asthma related complications, hospitalizations, and possibly death.

Introduction

- RSV presents in infants with mild to severe respiratory tissue inflammation and apnea.
- Asthma is an obstructive airway disease which affects millions of children and adults worldwide causing shortness of breath, wheezing, and airway constriction.
- The purpose of this study is to determine if infants previously diagnosed with RSV bronchiolitis have an increased risk of asthma diagnosis compared to infants not diagnosed with RSV.

Statement of the Problem

- With increasing incidence of asthma in children, many primary care and pediatric providers are diagnosing and managing this disease.
- Studies are needed to show causative factors for patient prevention and education, which may lead to better patient outcomes.

Research Question

- Are infants previously diagnosed with RSV bronchiolitis versus infants without this diagnosis more likely to be diagnosed with asthma later in life?

Literature Review

- PubMed, The Cochran Library, and MEDLINE article search
 - MeSH terms: "asthma", "Respiratory Syncytial Virus", "bronchiolitis".
- Pathophysiology of RSV and asthma
- Genetic component of asthma
 - Case-control study of two cohorts with 800 subjects investigated genotype 17q21 linked with asthma and RSV. Interaction found with 17q21 genotype, wheezing from virus, and asthma development (Çalışkan et al., 2013).
 - Literature review of 58 studies found RANTES polymorphism, mannose-binding lectin, interferon gamma, and single nucleotide polymorphisms (SNPs) coding for IL-8, IL-13, IL-19, and IL-20 lead to wheezing after infant RSV infection (Drysdale, Milner, & Greenough, 2012).
- Causative correlation with RSV bronchiolitis and asthma
 - Case-control of 189 children ages 5-9 proved RSV infection increased risk for asthma; independent from proven risk factors (Cassimos et al., 2008).
 - Cohort hospital-based study including 272 children found that infantile bronchiolitis resulted in lung obstructive patterns, bronchial hyperresponsiveness, and asthma (Mikalson, Halvorsen, & Øymar, 2012).
 - Clinical animal trial study with 72 mice found that viral infections with sensitization can lead to asthma (Siegle et al., 2010).
 - Meta-analysis of the relationship between viral lower respiratory tract infection (LRTI) and atopy found association between previous rhinovirus and LRTI and asthma (Walton & Johnston, 2008).
 - Cohort study including 95,310 infants found infants age 122 days at peak of viral season had highest risk of bronchiolitis and was proven to increase risk of asthma in childhood (Wu et al., 2008).
 - Literature review of 130 articles concluded a casual and associative relationship between RSV and asthma (Wu & Hartert, 2011).
 - Clinical animal trial studies of 16 mice concluded that airway is compromised after RSV infection and suggest TNF-a and IL-13 are potential targets for treatment (You et al., 2006).

Discussion

- Infantile respiratory syncytial virus bronchiolitis can lead to asthma later in life, but asthma development is attributed to several factors.
- Severe lower respiratory infections have the highest risk for subsequent asthma associated with wheezing, airway hyperresponsiveness, obstruction, and remodeling.
- Amount and young age of viral respiratory infections have highest correlation with wheeze, dyspnea, and persistent dry cough.
- Genetic studies reveal that airway remodeling occurs after RSV bronchiolitis infection, which may lead to asthma.
- Timing of birth (122 days prior to peak viral season) increased risk for asthma, showing birth timing and viral season may impact airway disease.
- Conversely, infants born twelve months prior to peak winter viral season were at the lowest risk to develop asthma.
- Risk of hospitalization for treatment of asthma after RSV infection is increased until thirteen years of age and even up to age 18-20.

Applicability to Clinical Practice

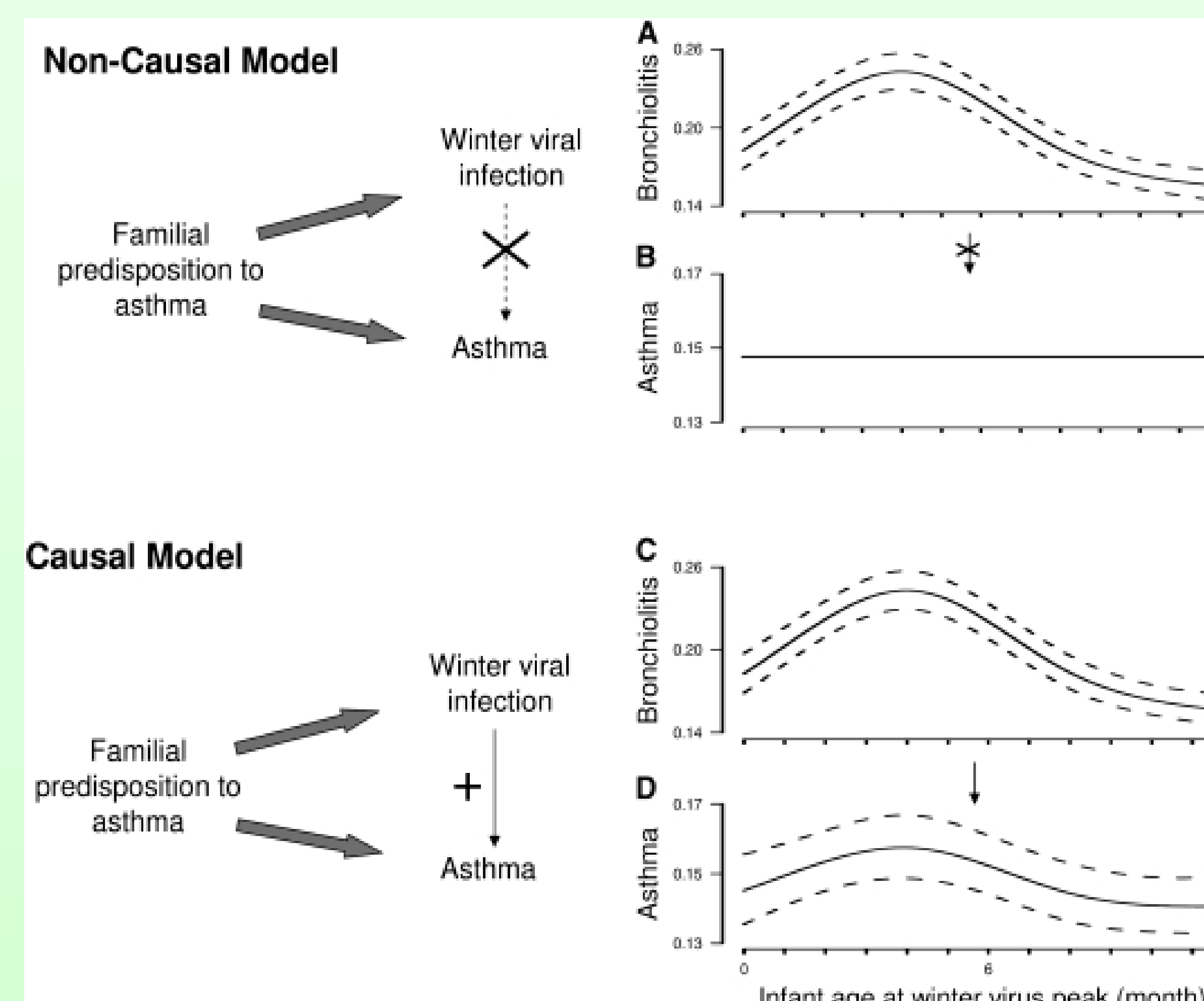
- RSV bronchiolitis is a piece of the asthma risk factor puzzle, and indicates that health care providers need education regarding increased risk of atopy.
- Symptomatic recommendations such as avoidance of smoking around children and pregnant women improves patient outcomes and reduces risk of asthma related complications, hospitalizations, and mortality.
- Prevention is paramount for RSV risk reduction and may be presented in public health arenas or within the space of a well child appointment or prenatal visit.
- Expensive hospitalizations and complications such as wheezing, apnea, shortness of breath, chronic dry cough and possibly asthma caused by RSV can be avoided through prevention with sanitation and infection control.
- RSV antibody injections are available to premature infants and an argument may be made to include vaccination recommendations for high risk term infants born two to six months prior to peak viral season.

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