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Risk Factors Associated With Hospital Readmission in Pediatric Asthma

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Asthma is a leading cause of hospitalization among children, and about 15–50% of pediatric patients are readmitted after an index admission. The purpose of this integrative review is to explore contemporary scientific findings on the association between pediatric asthma readmission and various demographic, environmental, psychosocial and clinical risk factors. An electronic database search resulted in a sample of 29 studies. African American, public or no insurers, previous admission and complex chronic comorbidity were identified as risk factors associated with pediatric asthma readmission. However, more interdisciplinary and well-designed investigations are warranted to further explicate the spectrum of environmental and psychosocial correlates. Published by Elsevier Inc.

ASTHMA IS A leading cause of hospitalization among children (Bloomberg, Trinkaus, Fisher, Musick, & Strunk, 2003; Nelson & Zorc, 2013) and together with infections contributes one-third to one-half of all hospitalizations for children 1–9 years of age (Bloomberg et al., 2003; Nelson & Zorc, 2013). Previous studies demonstrated that upwards of 40% of pediatric asthma hospitalizations are repeat hospitalizations (i.e., the child had been hospitalized for asthma previously). Moreover, hospitalizations accounts for nearly one-third of national pediatric asthma costs (Kenyon et al., 2014). Therefore, the reduction of repeat hospitalizations could significantly reduce costs of health care in addition to improving patient outcomes (Kenyon et al., 2014).

Over the past two decades, the specific issue of readmissions has drawn the attention of investigators in England, Canada, and New Zealand, as well as the United States (refer to Table 1). These studies have examined readmission over various time periods ranging from 7 days to 4 years. However, in clinical practice, it is difficult to assimilate these findings and determine which hospitalized children with asthma are at risk of experiencing a subsequent asthma readmission. Delineating risk factors for asthma readmission in a manner directly applicable for clinical practice could help health care providers target discharge transition and chronic care improvement efforts to high-risk populations.

In studies examining readmission among pediatric asthma populations, one focus has been on identifying population characteristics and other risk factors associated with hospital readmissions and/or emergency department (ED) re-visits. Variables typically considered by these studies as risk factors associated with susceptibility for readmission have included age at first admission, sex, race/ethnicity, acute severity of asthma, chronic asthma severity, previous admissions, socioeconomic status, parental knowledge, and drug management (Bloomberg et al., 2003). With the rapidly accumulating research evidence, a systematic literature review of studies examining risk factors related to hospital readmission in pediatric asthma could provide the foundation necessary to develop interventions directly applicable to practice. This systematic review explores the current empirical literature with the specific aim of integrating research findings related to identification of risk factors

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Table 1 Samples of study reports included in the integrative review.

Citation/Population	Defined readmission	Setting	Design	Variables/Confounding factors	Results/Findings
Newman et al. (2014)/n = 758, 1–16 years, USA	Hospital readmission within 12 months	Cincinnati Children's Hospital Medical Center, an urban tertiary care hospital between August 2010 and October 2011	A population-based prospective observational cohort study	Traffic-related air pollution (TRAP) exposure, covariate including race, controller medication, tobacco smoke exposure, the presence of cracks or holes in walls and bedroom carpet, caregiver psychological distress, allergy-specific IgE for ragweed, white oak, animal dander of cat, dog and mouse, American cockroach, as well as 2 types of dust mite	Multivariate analysis • TRAP exposure 3.0 [1.1–8.1] only for Caucasian o TRAP exposure 1.1 [0.6–1.8] for African American
Topal et al. (2014)/n = 1177, 6 month-17 years, Turkey	Hospital readmission in 7 days	Pediatric emergency department (ED) and allergy and asthma departments at 3 teaching and research hospitals including Gazi University Faculty of Medicine, Gulhane Military Medical Academy, and the Medical School, Diskapi Education and Research Hospital	Prospective study	Age, sex, exposure to cigarettes, breast feeding for less than 6 months, regular follow-up by allergy specialist, historical severity of asthma, level of control, preventive treatment, time of last attack, number of attacks in previous year, number of attacks requiring systemic steroids, number of attacks requiring hospitalization, short-acting β_2-agonists within 6 hours before admission, severity of attack at admission, signs of physical exam such as retractions and oxygen saturation, treatment given at hospital, drug prescribed when discharge to home, instructional plan provided at discharge	Multivariate analysis • short-acting β2-agonists within 6 hours before admission 2.43 [1.73–3.43] • No prescribed high dose inhaled steroids 2.02 [1.37–3.00] • Accessary respiratory muscle retraction at admission 1.76 [1.12–2.77] • No written instructional plan 1.55 [1.08–2.23]
Howrylak et al. (2014)/n = 774, 1–16 years; USA	Hospital readmission in 12 months	Cincinnati Children's Hospital Medical Center (CCHMC) (urban, tertiary care, pediatric stand-alone hospital)	Prospective observational cohort	Caregivers reported any tobacco exposure at home, in a secondary residence, or in the car. Measured serum and saliva cotinine levels with mass spectrometry	Multivariate analysis o Caregiver report of any tobacco exposure 1.18 [0.79–1.89]) • Detectable serum or salivary cotinine (1.59 [1.02–2.48] and 2.35 [1.22–4.55], respectively).

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