

# IMPROVING ASTHMA CARE FROM HOSPITAL TO HOME TO PREVENT HOSPITAL READMISSIONS

## WHAT WE ASKED:

What is the relationship between if and when patients fill asthma prescriptions after being discharged from the hospital and hospital readmission rates? What strategies improve care from the hospital to the home for children with asthma?

## WHAT WE DID:

In the US, asthma is the single most common chronic condition in children, with 6.8 million affected by the disease. Asthma is also one of the leading causes of hospital admission and readmission, resulting in 150,000 asthma hospitalizations annually. To determine the relationship between patients filling asthma prescriptions after being discharged from the hospital and hospital readmission rates, we conducted a study to determine the proportion of Medicaid patients from 2005-2007 who filled recommended discharge prescriptions within three days of pediatric asthma hospital discharge. We hypothesized that filling prescriptions of three classes of asthma medications prescribed during hospitalization (short-acting beta agonists, oral steroids, and inhaled steroids) within three days of hospital discharge would be associated with a reduction in readmission at various

intervals. These three classes of asthma medications are typically prescribed following asthma hospitalization for immediate relief of ongoing symptoms (beta agonists), treatment of prolonged flare-ups (oral steroids), and prevention of future symptoms and flare-ups (inhaled steroids).

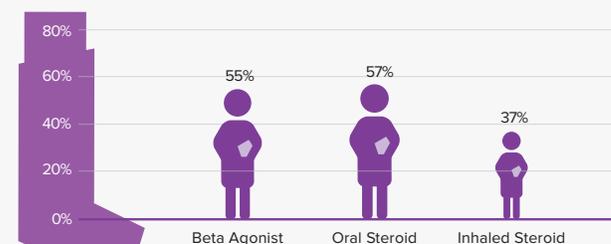
We then conducted a research synthesis to gather the evidence for hospital therapies delivered to asthma patients outside of the intensive care unit, including routine care, care escalation and discharge care. We also summarized recent literature on quality improvement efforts focused on hospital care and highlighted future opportunities for improving both hospital care and transition back to the home environment.

\* FOR DETAILED STUDY METHODS, SEE THE BACK OF THIS SHEET.

## WHAT WE FOUND:

- ▶ Filling prescriptions for beta agonists and inhaled steroids was associated with a diminished risk of readmission within 14 days. For inhaled steroids, this effect persisted up to 90 days.
- ▶ Patients who filled all three recommended medications following discharge had the lowest risk of readmission within 14 days and a statistically significant reduction in readmission risk between 15 and 90 days.
- ▶ Younger children and children covered by Medicaid are less likely to be prescribed inhaled steroids at discharge.
- ▶ Inpatient family education programs can be effective but should incorporate multiple strategies, including individualized management strategies and post-discharge follow-up.

### Prescription Fills Within 3 Days of Hospital Discharge



Within 3 days of discharge, only 55% of children filled a prescription for a beta agonist, 57% for an oral steroid, and 37% for an inhaled steroid.

## WHAT IT MEANS:

Hospitals should facilitate efforts to ensure that families are prescribed and fill recommended asthma discharge medications.

Preferably, families **should have the actual medications in hand at discharge**, allowing the care team to address any potential barriers (such as insurance non-coverage or unexpectedly large copays) prior to discharge.

Interventions to improve post-hospitalization medication adherence using technology for patient and family engagement could augment current strategies.

Enhancing relationships between inpatient providers and care coordinators, community resources, and health departments will help identify and intervene on the social determinants of asthma care utilization in the home and community environment.

## STUDY METHODS:

This was a retrospective cohort analysis of Medicaid Analytic Extract (MAX) files from 12 geographically diverse states from 2005-2007. The 12 states selected for this analysis included a geographically diverse sample with at least two states from each of the four census regions of the US. We included the most populous state from each census region (New York, Illinois, Texas and California), and eight states reported to have research quality MAX inpatient and drug encounter claims data.

Patients ages 2-18 years with claims for inpatient hospitalizations with primary diagnoses of asthma (International Classification of Diseases, Ninth Revision Code 493.XX) from January 1, 2006 to September 30, 2007 were included. This allowed for a 365-day look-back period to assess prior care and a 90-day observation period following discharge to assess for subsequent prescription medication fills and hospitalizations. For those patients with multiple hospitalizations, we only used the first admission as the index admission. We excluded patients <2 years of age because other wheezing illnesses, such as bronchiolitis, may confound the diagnosis of asthma. In addition, we excluded patients who died during their index hospitalization or were discharged to care other than home or self-care.

The outcome of interest was time to inpatient readmission for a principal or secondary diagnosis of asthma within 90 days of index hospital discharge. We included secondary diagnoses of asthma to include readmissions for all asthma-related conditions. Our predictors of interest were pharmacy claims for: (1) short-acting beta agonists; (2) oral corticosteroids; and (3) inhaled corticosteroids or a combination inhaled steroid and long-acting beta agonist between one day prior and three days subsequent to hospital discharge.

Covariates included patient characteristics, including demographics, prior utilization and index hospitalization factors, and billing provider number. The billing provider represents the entity that submitted the inpatient claim, which could be either an individual physician or an institution. Demographic variables were age, sex, race/ethnicity and enrollment in a Medicaid managed care plan at the time of index hospitalization.

We used a multivariable extended Cox model to investigate the association of filling recommended prescription medications and hospital readmission within 90 days. To estimate the cumulative risk of readmission for the treated relative to the untreated groups for the primary exposure variables, we used a logistic regression model including the same covariates to derive estimated probabilities of readmission at 0-14 days and 15-90 days both with and without medication fills.

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RELATED WORK: <http://policylab.chop.edu/project/managing-health-children-asthma-hospital-community>

### PUBLICATIONS:

Kenyon C, Rubin D, Zorc J, Mohamad Z, Faerber J, Feudtner C. (2015) Childhood Asthma Hospital Discharge Medication Fills and Risk of Subsequent Readmission. *The Journal of Pediatrics.* DOI: 10.1016/j.jpeds.2014.12.019

Kenyon C, Auger K, Adams S, Loechtenfeldt A, Moses J. (2015) Improving Asthma Care in the Hospital: an Overview of Treatments and Quality Improvement Interventions for Children Hospitalized for Status Asthmaticus. *Current Treatment Options in Pediatrics.* DOI 10.1007/s40746-014-0003-3

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