Tatchaporn Ongphichetmetha

Impact of Non-Adherence to Inhaled Corticosteroids on Asthma Control in Adult Patients

Background:

Asthma is a chronic condition affecting millions of adults worldwide, characterized by symptoms such as wheezing, breathlessness, and chest tightness. Inhaled corticosteroids (ICS) are commonly prescribed to reduce airway inflammation and prevent attacks, yet adherence remains a major challenge. While the importance of ICS adherence for asthma control is well recognized, the specific impact of non-adherence on symptom frequency is less well understood. This study aims to assess whether non-adherent adult asthma patients in the U.S. are more likely to experience poor asthma control, defined as more than 8 symptom days in the past month. The research question is: Does regular ICS use over the past three months reduce the likelihood of poor asthma control? We hypothesize that non-adherent patients are more likely to experience uncontrolled asthma compared to those who adhere to their ICS regimen.

Methods:

This cross-sectional study used data from the 2022 ADULT Asthma Call-Back Survey (ACBS), a follow-up to the BRFSS that focuses on asthma management. The sample included U.S. adults (≥18 years) with self-reported asthma. The exposure was non-adherence to ICS in the past three months, classified via self-report. The primary outcome was asthma control, dichotomized as poorly controlled (>8 symptom days/month) or well-controlled (≤8 days). Covariates used in the propensity score model included age, insurance status, history of asthma attacks, number of checkups, ER visits, hospitalizations, asthma education, environmental control practices (e.g., mattress cover use, air cleaner use, indoor pets), inhaler training, and cost-related medication barriers.

To reduce confounding, two propensity score methods were applied: 1:1 matching without replacement and inverse probability of treatment weighting for the average treatment effect on the treated (ATT). Covariate balance was assessed using standardized mean differences and Rubin's rules. Logistic regression models were used to estimate the association between ICS adherence and asthma control in both matched and weighted samples. Sensitivity analysis assessed the potential impact of unmeasured confounding.

Results:

A total of 2,921 adult asthma patients were included, with 435 in the non-adherence group and 2,486 in the adherence group. In the unadjusted analysis, the odds of poorly controlled

asthma in the non-adherence group were 0.669 times those in the adherence group (95% CI: 0.554–0.820). After 1:1 propensity score matching, the odds ratio was 0.698 (95% CI: 0.534–0.911). ATT weighting yielded a similar odds ratio of 0.656 (95% CI: 0.534–0.807), consistent with models that incorporated both ATT weights and propensity score adjustment. Covariate balance was substantially improved in both adjusted analyses. Sensitivity analysis indicated that an unmeasured confounder would need to increase the odds of non-adherence by approximately 2.3 times ($\Gamma \approx 2.3$) to fully explain the observed association.

Conclusions:

In this study, adult asthma patients who did not regularly use ICS in the past three months had lower odds of experiencing uncontrolled asthma compared to those who adhered. Although these findings are unexpected, they suggest that unmeasured factors may have influenced the results. Future longitudinal research with richer data on clinical and social determinants—such as education, comorbidities, and socioeconomic status—is needed to better understand the complex relationship between ICS adherence and asthma control.