Metformin Use and Asthma Outcomes among Patients with Concurrent Asthma and Diabetes

Chung-Hsuen Wu (吳宗軒), Ph.D.
Assistant Professor (助理教授)
College of Pharmacy (藥學院 藥學系)
Taipei Medical University (台北醫學大學)
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Outline

• Background
• Methods
• Results
• Discussion
• Conclusion
Background

- Asthma and diabetes are both prevalent chronic diseases
- Diabetes is a common comorbid condition among adult patients with asthma.¹,²
- Patients with concurrent asthma and diabetes had poorer glycemic control and quality-adjusted life expectancy.³

Background

• Metformin
  – Recent animal studies anti-inflammatory effect of metformin can reduce airway inflammation.\(^1,2\)
  – Metformin a first-line treatment for patients with diabetes
  – Whether metformin use could reduce airway inflammation among patients with asthma?

Aims

• Study purpose:
  – To evaluate the association between the use of metformin and asthma-related outcomes among patients with concurrent asthma and diabetes.

• Hypothesis:
  – Metformin users were associated with a lower risk of asthma-related hospitalization, ER visit, and exacerbation
Methods

• Data source: National Health Insurance Research Database (NHIRD), 2001-2011
• Design: a retrospective cohort study
• Inclusion/exclusion criteria
  – Aged ≥ 18
  – Asthma (ICD-9-CM: 493.x) and diabetes (250.x) (both must occur before the index date)
  – Enrollment period: 2002-2008
  – Index date: the date of the first metformin prescription
  – Follow up for 3 years

Methods

• Exclusion criteria
  – Use metformin before the index date
  – COPD (ICD-9CM: 491.xx, 492.xx or 496.xx), any respiratory tract cancer (161, 161.x, 162, 163, 163.x, 231, 231.x), or bronchiectasis (494.xx)
  – Patients were also excluded if they had an asthma-related hospitalization or emergency room visit during the pre-index period.
Methods

Healthcare resource utilization

- Ambulatory Care Expenditures by Visits (CD)
- Inpatient Expenditures by Admissions (DD)
- Expenditures for Prescriptions Dispensed (GD)

Beneficiary information

- Registry for Beneficiaries (ID)

Other datasets
- Details of inpatient orders (DO)
- Details of prescriptions dispensed at contracted pharmacies (GO)

Data source: Taiwan Ministry of Health and Welfare, Department of Statistics

Methods

- Inclusion/exclusion criteria

Li CY, Erickson SR, Wu CH. (2016) "Metformin use and asthma outcomes among patients with concurrent asthma and diabetes." Respirology. 2016 May 31; [Epub ahead of print]
Methods

• Outcomes (dependent variable)
  – Asthma related hospitalization
  – Asthma related ER visits
  – Asthma exacerbation
    • A systemic corticosteroid + asthma-related hospital admission
    • A systemic corticosteroid + an emergency room visit

• Exposure (independent variable)
  – Metformin use

Methods

• Covariates:
  – Charlson comorbidity index (CCI)
  – Cardiovascular diseases, dyslipidemia, metabolic syndrome end stage renal disease, heart failure or chronic liver disease.
  – Asthma medications
  – Diabetes medications
Methods

• Statistical analysis
  – The Student’s t-test and chi-square test were used to compare differences in means of continuous variables and percentage
  – Multivariable logistic regression models were used to estimate adjusted odds ratios (ORs)
  – SAS 9.3 (SAS Institute, Cary, NC, USA)

Results

• Asthma related hospitalization
  – OR: 0.21, 95% CI: 0.07–0.63
• Asthma related ER visits
  – OR: 0.62, 95%: 0.26–1.44
• Asthma exacerbation
  – OR: 0.39, 95%: 0.19–0.79
Discussion

• Main finding
  – Metformin users were associated with a lower risk of asthma-related hospitalization and an asthma exacerbation than metformin non-users among patients with concurrent asthma and diabetes.

• Advantages
  – Metformin may be associated with a reduced risk of airway inflammation, which was reported in previous animal studies
  – Disease diagnosis and medication records
  – Asthma exacerbation

Challenges (Limitations)

• Smoking, exercise, diets, allergens, infections, air pollution, etc.
• Socioeconomic status: education, income
• BMI (obesity)
• Medication taken
• Severity of asthma
Conclusion

• In summary, metformin use is potentially associated with improvements in asthma control among patients with concurrent asthma and diabetes.

• From a clinical perspective, metformin can become a priority selection among patients with diabetes and asthma.

Thank you!

chunghwu@tmu.edu.tw