

A Cost-Effectiveness Analysis of Azithromycin for the Prevention of Acute Exacerbations of Chronic Obstructive Pulmonary Disease

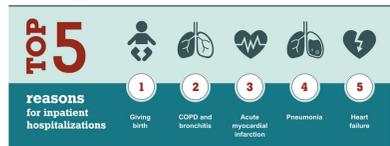


Safa Ahmadian, Don D Sin, Larry D. Lynd, Mark Harrison, Mohsen Sadatsafavi

Respiratory Evaluation Sciences Program, Faculty of Pharmaceutical Sciences, University of British Columbia

Background

COPD is a chronic lung disease comprised of chronic bronchitis and emphysema, characterized by progressive airflow limitation and periods of acute worsening of respiratory symptoms, called exacerbations¹. Severe COPD exacerbations are a major cause of morbidity and mortality among COPD patients². They are associated with high costs and low quality of life³.



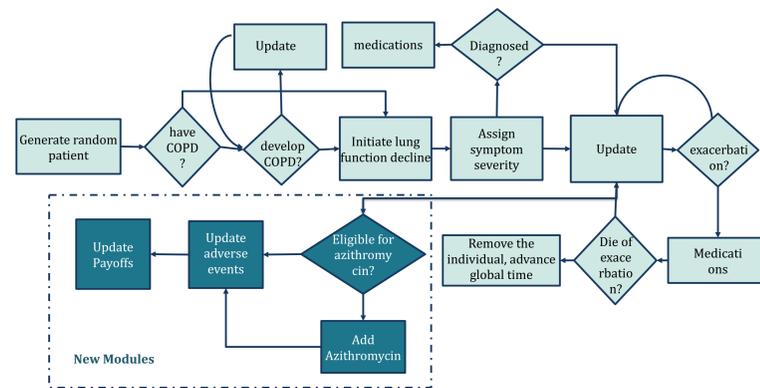
Low-dose azithromycin therapy reduces risk of acute exacerbations of Chronic Obstructive Pulmonary Disease (COPD)⁴. However, its role in the treatment of COPD remains controversial owing to its side effects.

Objective

To evaluate the cost-effectiveness of azithromycin therapy in COPD patients compared to usual care (continuation of high-dose inhaled therapy), and to find the optimal subgroup-defining criteria for eligibility for preventive azithromycin therapy.

Method

Evaluation Platform in COPD (EPIC) is an open-source, population-based, “whole-disease” model for COPD in Canada⁵. The baseline of the model is a discrete event, microsimulation of Canadians over 40-years-old, from 2020 onward. It models the life history of individuals, one at a time, from entrance into the model until they die, or the time horizon is reached.



Inclusion criteria:

COPD patients with ≥ 40 years of age, who are on triple therapy (ICS/LABA/LAMA)

Exclusion criteria: Impaired hearing, Prolonged corrected QT interval, asthma

Time horizon: 20 years, **Discount rate:** 1.5%

Bacterial resistance: Gradual decline in treatment effect⁶: $RR = RR_0 \exp(-k \cdot (\text{year}-1))$

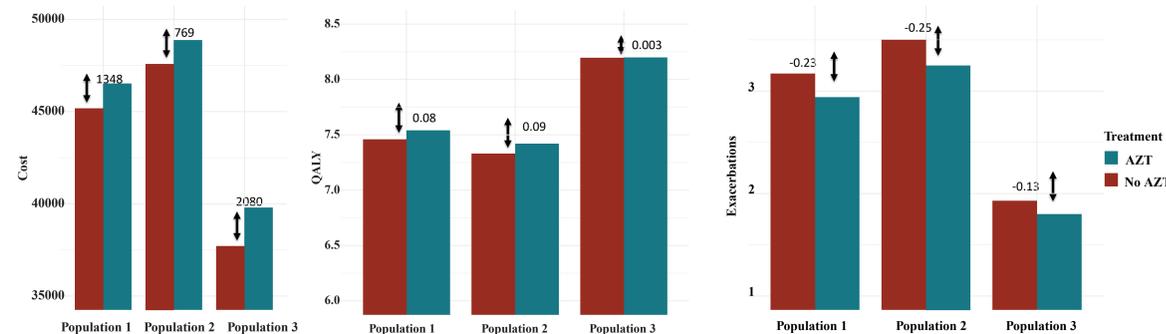
Hearing Impairment: Discontinuation of the treatment and use of hearing aids

Cardiovascular death: 288% higher risk of CV death in 5 days⁷

Gastrointestinal Symptoms: Vomiting, abdominal pain, diarrhea, and decreased appetite⁸.

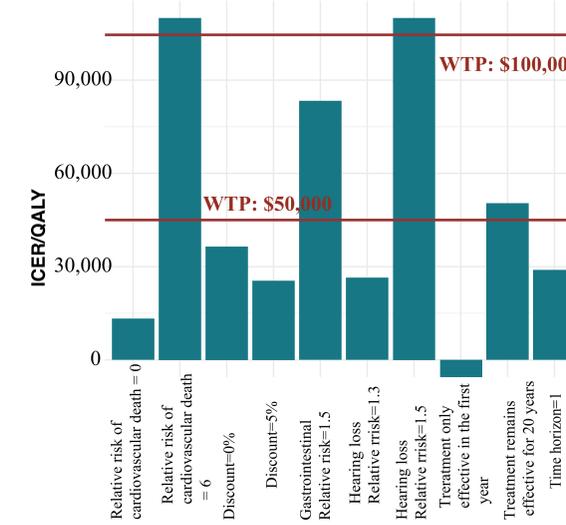
Results

	Population 1	Population 2	Population 3
ICER (per QALY gained)	\$16850	\$8544	\$693333
ICER (per exacerbation avoided)	\$5860	\$3076	\$16000



- Population 1: (**the reference population**): Patients with ≥ 1 moderate/severe exacerbation in the past 12 months.
- Population 2: Patients with ≥ 2 moderate or ≥ 1 severe exacerbation in the past 12 months
- Population 3: Patients with no moderate/severe events in the past 12 months

Sensitivity analyses



Conclusion

The use of azithromycin is associated with **increased costs due to the cost of treatment** and the potential side effects. However, long-term therapy with azithromycin is **cost-effective in COPD patients with a recent history of exacerbations**. Our results were robust to changes in assumptions about the long-term efficacy of azithromycin in the face of potential development of antibacterial resistance.

New evidence on the community effects of antimicrobial resistance, as well as more accurate estimates of the risk of adverse events and costs associated with azithromycin, can further improve the robustness of results and guideline recommendations.

References

- Global Initiative for COPD [2021]
- Vestbo J et al. [2011]
- Canadian Institute for Health Information[2020]
- Albert et al. [2011]
- Sadatsafavi et al. [2019]
- Pomares et al. [2018]
- Ray et al. [2012]
- Almarino et al. [2018]