CoLab Network

Summary Report

The Efficacy and Safety of Biologic Drugs to Treat Severe Asthma

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This Rapid Review was conducted by the Alberta Drug and Technology Evaluation Consortium through the Post-Market Drug Evaluation CoLab Network.

Executive Summary

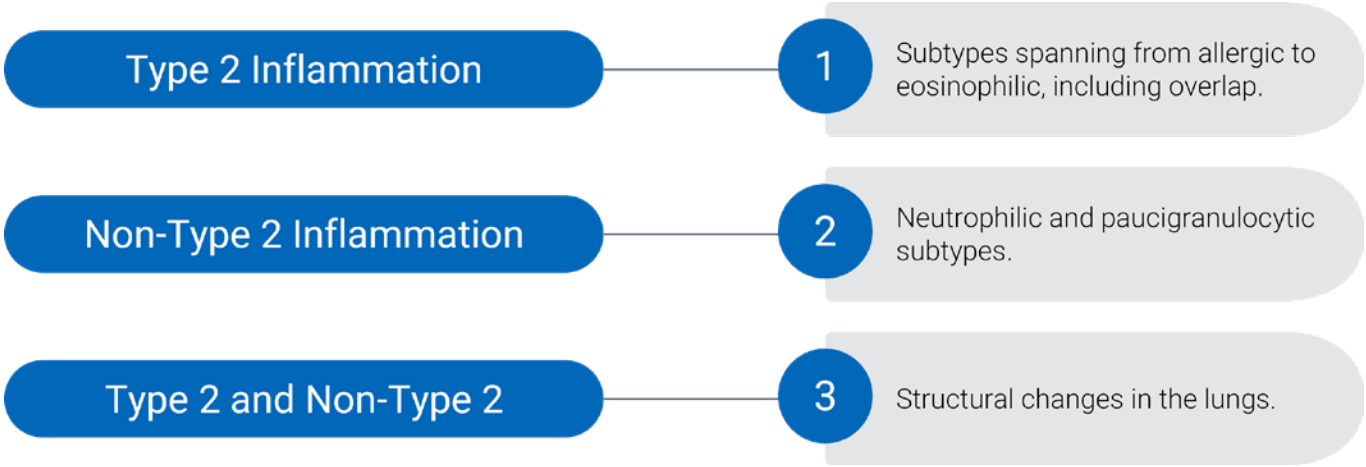
Several biologic drugs are available for the treatment of severe asthma. It is unclear how well the different drugs work across inflammatory subtypes of asthma. The objective of this Rapid Review was to examine the comparative efficacy and safety of biologics and to characterize the patient populations studied. Its purpose was to assess the feasibility of conducting a more comprehensive health technology assessment to guide drug funding criteria for public drug plans. The evidence included in the Rapid Review mainly focused on specific severe asthma subtypes. The studies lacked standardized eligibility criteria and outcome reporting across all asthma subtypes and patient populations, especially pediatric patients, making it difficult to compare the safety and efficacy of different asthma treatments. Further synthesis of the existing data is unlikely to provide new insights to further inform the reimbursement of biologics in severe asthma.

Background

Several biologic drugs are available for the treatment of severe asthma in Canada, including benralizumab, mepolizumab, dupilumab, omalizumab, and tezepelumab. Most biologics are designed to target specific inflammatory subtypes of asthma, particularly type 2 eosinophilic or allergic. The efficacy and safety of these drugs, especially in children, is not well characterized, and the criteria for their use vary.

Figure 1

Severe Asthma Typologies



Policy Issue

It is unclear how well the different biologic drugs work across asthma subtypes, whether formulary listing criteria and prescribing practices can be streamlined, or if any of the drugs are safer or more effective than others.

Policy Question

1. Is there evidence of comparative efficacy and safety to support harmonization of criteria for use of biologic drugs for patients with severe asthma (compared with current biologic-specific criteria)?

Objective

The objective of the Rapid Review was to describe the evidence on the comparative efficacy and safety of biologics and to characterize the patient populations studied. The Rapid Review was done to determine the feasibility of conducting a more fulsome health technology assessment, which would be used to provide guidance on aligning the drug funding criteria of public drug plans.

Results

Selection of Studies

Researchers used a rapid review approach to identify randomized controlled trials and systematic reviews that met the inclusion criteria. Forty-seven studies were included in the final analysis: 26 publications from 13 randomized controlled trials (a total sample population of 7,773 people, primarily adults) and 21 systematic reviews.

Critical Appraisal

All identified trials had clear study objectives, intervention(s), comparators, and outcomes, however, there were inconsistencies in reporting the characteristics of the enrolled populations and the subtypes of severe asthma. The severity of asthma was not precisely defined or characterized in many of the trials and systematic reviews. The recruitment, definitions, and criteria for subtypes of severe asthma, such as type 2 eosinophilic or allergic asthma, varied across studies.

Although risk of bias assessments revealed little to no risk of bias in the randomized controlled trials, the bias assessment indicated noteworthy concern for bias in the systematic reviews, with most reviews having at least 1 critical weakness and several noncritical weaknesses.

Findings

The included randomized controlled trials and systematic reviews focused on a limited range of asthma subtypes and age groups, with limited evidence on non–type 2 asthma subtypes and asthma in children. Recruitment and outcome reporting among different asthma subgroups was limited and varied, making it difficult to assess the efficacy of biologic drugs across the specific subgroups of severe asthma.

Certain biologics (benralizumab, dupilumab, mepolizumab, and tezepelumab) demonstrated efficacy in treating type 2 eosinophilic severe asthma, which is characterized by eosinophilic markers. However, determining which biologic is the most effective for this type of asthma was challenging due to the lack of head-to-head trials and the inherent limitations of indirect treatment comparisons.

The same biologics (benralizumab, dupilumab, mepolizumab, and tezepelumab) also seemed to work for those with type 2 eosinophilic asthma who also had allergic asthma markers.

The findings for biologics used in type 2 allergic asthma, beyond omalizumab, were limited due to the differences in classifying this subtype.

Determining the efficacy and safety of biologics in pediatric patients with severe asthma is challenging due to the exclusion of this population in clinical trials and a lack of outcome reporting specific to them.

Limitations

This was a focused rapid review that searched articles in English published since 2018. The severity of asthma was inconsistently defined. Many trials that studied patients with moderate to severe asthma were excluded from the Rapid Review because it could not be reliably determined if those trials were comparable to the included studies with patients with severe asthma.

This review was intended to identify available evidence quickly, so in-depth extraction of specific effect sizes or any attempt at meta-analysis or comparative efficacy testing was not performed.

Implications for Policy-Making

It is difficult to compare the safety and efficacy of different asthma treatments because studies lack standardized eligibility criteria and outcome reporting across all asthma subtypes and patient populations, especially pediatric patients. Further evidence synthesis is constrained by the nature of the existing evidence.

As a result, it is highly uncertain that evidence synthesis using data from available trials would lead to meaningful and policy-relevant conclusions. Based on this, CADTH will not proceed with conducting a more fulsome health technology assessment.

For more information on CoLab and its work visit the **CoLab website**.

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About CADTH: CADTH is a not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs and medical devices in our health care system.

About CoLab: CoLab is a pan-Canadian network of experts in applied research, scientific methods, and data analysis. CoLab members work with CADTH's Post-Market Drug Evaluation Program to produce credible and timely evidence on post-market drug safety and effectiveness.