CICER
Tacaíocht don Treoirlíne Chliniciúil
Clinical Guideline Support

THE MANAGEMENT OF ACUTE ASTHMA ATTACK IN ADULTS

Protocol for a review of international clinical guidelines

FEBRUARY 2025

Health Information and Quality Authority
An tÚdarás Um Fhaisnéis agus Cáilíocht Sláinte

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

NATIONAL CLINICAL EFFECTIVENESS COMMITTEE

HRB An Bord Taighde Sláinte
Health Research Board

About CICER

In 2016, the Department of Health requested that the Health Research Board (HRB) fund an evidence synthesis service to support the activities of the Minister-appointed National Clinical Effectiveness Committee (NCEC). Following a competitive process, HIQA was awarded research funding spanning the period from 2017 to 2024 to produce the evidence to support the development of National Clinical Guidelines. This funding was renewed through a competitive process to support the work of the Centre in Ireland for Clinical guideline support and Evidence Reviews (CICER) from 2024 to 2028. CICER comprises a dedicated multidisciplinary research team supported by staff from the Health Technology Assessment team in HIQA, the Discipline of Public Health and Primary Care in the School of Medicine in Trinity College Dublin, as well as national and international clinical and methodological experts.

With regard to clinical guidelines, the role of the CICER team is to independently review evidence and provide scientific support for the development, by guideline development groups (GDGs), of National Clinical Guidelines for the NCEC. The CICER team undertakes systematic reviews of the clinical effectiveness and cost effectiveness of interventions included in the guidelines, as well as estimating the budget impact of implementing the guidelines. The CICER team also works closely with the GDGs and provides tailored training sessions; assists in the development of clinical questions and search strategies; performs systematic reviews of international clinical guidelines and supports the assessment of their suitability for adaptation to Ireland; and supports the development of evidence-based recommendations informed within the National Clinical Guidelines.

How to cite this protocol:

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Table of Contents

List of Tables

List of abbreviations that appear in this report

AGREE	Appraisal of Guidelines for Research and Evaluation
AGREE GRS	Appraisal of Guidelines for Research and Evaluation Global Rating Scale
CICER	Centre in Ireland for Clinical guideline support and Evidence Reviews
ECMO	extracorporeal membrane oxygenation
EtD	Evidence to Decision framework
FENO	fractional exhaled nitric oxide
FEV1	forced expiratory volume in one second
GDG	guideline development group
GINA	Global Initiative for Asthma
GRADE	Grading of Recommendations, Assessment, Development, and Evaluations
NCG	national clinical guideline
NCEC	National Clinical Effectiveness Committee
PICO	population, interest, context, outcome
PICS	population, interest, context, search period

1 Background

1.1 Description of the condition

Asthma is defined as a chronic inflammatory disorder, in which the bronchial airways in the lungs become narrow and swollen, making it difficult to breathe.[1, 2] Asthma can range in severity from mild to severe, with typical symptoms including wheezing, coughing, shortness of breath, and chest tightness.[3] The causes of asthma vary: it is a "complex genetic disorder with strong environmental influence", whose risk factors include air pollution, smoking, atopy (a genetic tendency to develop an exaggerated immune response), stress, and obesity.[4, 5]

Asthma can develop at any age, and risk factors and comorbidities appear to vary by age of onset.[6, 7] In childhood, more boys than girls have asthma, while in adulthood, women have higher rates of asthma than men.[8-10] There is evidence from other high-income countries that socioeconomic deprivation is associated with worse asthma control and increased exacerbation rates.[9, 11-13]

Approximately 5-10% of the adult population in Ireland has been diagnosed with asthma,[14-16] and in 2021, asthma was the registered cause of death in 62 fatalities in Ireland.[17] Asthma is associated with an increased risk of accompanying health conditions, including rhinitis, sinusitis, gastroesophageal reflux, and obstructive sleep apnoea.[18, 19] Asthma can have a significant impact on individuals' quality of life, especially when it is in the severe range.[20] Asthma may interfere with daily activities and can lead to negative psychological effects like depression and anxiety.[21] It can also lead to missed work or school and to financial costs for the individual and the health system.[22, 23]

Routine management of asthma usually involves monitoring for signs and symptoms, avoiding triggers, and taking medications.[24] Bronchodilator inhalers (such as salbutamol, terbutaline, and ipratropium bromide) can help to relax the lung muscles and open up the air passages to relieve symptoms, while steroid inhalers (such as fluticasone, beclomethasone, and budesonide) work by reducing inflammation in the airway. More severe chronic asthma may require management with oral medicines, such as leukotriene receptor antagonists or steroid tablets, or with injectable biologic therapies.

Occasionally, individuals with asthma may experience sudden worsening of their symptoms, also known as an asthma exacerbation or an asthma attack. Asthma attacks are characterised by rapid breathing, difficulty speaking, accelerated heart rate, and low oxygen saturation.[25] They can be triggered by viral respiratory infections, like the common cold, or by exposure to allergens.[26, 27] Asthma attacks can sometimes become acute and or life-threatening,

requiring emergency medical intervention. Emergency treatment for an acute asthma attack may include oxygen, bronchodilators, and corticosteroids, and in extreme cases, mechanical ventilation.[28] Fatal exacerbations are more likely among those with a history of near-fatal asthma and those who have had a hospitalisation or emergency care visit for asthma in the past year.[29] A confidential inquiry in the UK in 2014 found that two-thirds of deaths from asthma involved at least one potentially avoidable factor, most often clinicians not recognising patients' high-risk status and clinicians lacking specific asthma expertise.[30]

1.2 Clinical guidelines on asthma in adults

In 2015, a National Clinical Guideline (NCG) on *Management of an Acute Asthma Attack in Adults (aged 16 years and older)* was published in Ireland.[31] The guideline was developed by a sub-group of the National Clinical Programme for Asthma. The aim of the guideline was to assist healthcare professionals in all care settings in assessing and making decisions on the management of an acute asthma attack in adults and to assist policy-makers and those planning acute services for adult asthma patients. The scope of the guideline did not include children aged less than 16 years and did not address "difficult/severe but stable" asthma. Many of the recommendations in the guideline were based on recommendations from the British Guideline on the Management of Asthma [32] and the Global Strategy for Asthma Management and Prevention.[1]

1.3 Purpose of this review

The purpose of this review is to identify and appraise current clinical guidelines on the management of an acute asthma attack in adults that could be used to support an update of the NCG on management of an acute asthma attack. The results of this review can be used to inform the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Evidence to Decision (EtD) framework process for adoption, adaptation, and de novo development of trustworthy recommendations.[33]

2 Methods

This protocol outlines the proposed approach to conducting a systematic review of clinical guidelines on the management of an acute asthma attack in adults.

2.1 Review question

This review will consider the following questions:

- What relevant clinical guidelines on the management of an acute asthma attack in adults (aged 16 years and above) are currently in use internationally?
- What relevant recommendations do these guidelines include and what is the evidence underlying each relevant recommendation?

The review questions were formulated in line with a modified version of the PICO (Population, Intervention, Comparison, Outcome) framework, as presented in Table 2.1.

Table 2.1 Population, Interest, Context, Search period (PICS) for review of asthma guidelines

Population	Adults (defined as those aged 16 years or older) experiencing an acute asthma attack (defined as sudden worsening of asthma symptoms and lung function) presenting to primary care or hospital setting
Interest	Clinical guidelines that describe the management of an acute asthma attack in adults, relating to one or more of the following primary topics: ▪ Peak flow cut-offs as an indicator to inform hospital admission and or emergency department discharge ▪ Respiratory rate as an indicator to inform hospital referral and or admission and or intensive care unit admission ▪ Use of high-flow oxygen in an acute asthma attack ▪ Use of oxygen-driven versus air-driven nebulisers in an acute asthma attack in primary care ▪ Addition of an anti-cholinergic to beta2-agonist bronchodilators in an acute asthma attack ▪ Use of beta2-agonists intravenously in an acute asthma attack ▪ Use of heliox in an acute asthma attack ▪ Use of intravenous magnesium in an acute asthma attack ▪ Use of extracorporeal membrane oxygenation (ECMO) for near-fatal asthma attack refractory to conventional ventilator treatment ▪ Use of intravenous aminophylline in an acute asthma attack ▪ Use of leukotriene receptor antagonists, orally or intravenously, in an acute asthma attack Secondary topics of interest include: ▪ Spirometry (forced expiratory volume in one second, FEV1) for detecting and or assessing an acute asthma attack and to inform hospital referral and or admission ▪ Fractional exhaled Nitric Oxide (FeNO) for detecting and or assessing an acute asthma attack ▪ Respiratory rate for assessing severity of an asthma attack ▪ Use of nebulised magnesium sulphate in an acute asthma attack ▪ Use of intravenous fluid regimes in an acute asthma attack

	▪ Use of nebulised furosemide in an acute asthma attack ▪ Use of non-invasive ventilation in an acute asthma attack
Context	▪ Clinical guidelines (international or national), defined as systematically developed statements, based on a thorough evaluation of the evidence, to assist practitioner and patient decisions about appropriate healthcare for specific clinical circumstances. ▪ Regional or hospital-specific guidelines will not be included.
Search period	▪ 2018-present

2.2 Search strategy

Electronic searches will be conducted in MEDLINE Complete (Ebscohost), Embase (Ovid), CINAHL Complete (Ebscohost) and PsycINFO (Ebscohost). The search terms are provided in Appendix 1 and include database-specific thesauri and free-text terms. Grey literature sources will also be searched, including guideline repositories, guideline developer websites, websites of national ministries of health, and specific clinical specialty websites. The full list of grey literature sources is provided in Appendix 2. Members of the GDG will also be consulted to identify relevant clinical guidelines from their international and national expert knowledge.

2.3 Eligibility criteria

The inclusion and exclusion criteria for this review are provided in Table 2.2. Clinical guidelines will be defined as "systematically developed statements, based on a thorough evaluation of the evidence, to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances, across the entire clinical spectrum".[34]

Table 2.2 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Guidelines for asthma that: ▪ Focus on adults (defined as those aged ≥16 years) ▪ Clearly state the guideline development process and the evidence base that underpins each guideline recommendation ▪ Provide recommendations relating to acute asthma attacks, defined as sudden worsening of asthma symptoms and lung function, related to one or more of the following: ▪ Indicators of presence and or severity of an acute asthma attack	Guidelines for asthma that: ▪ Describe the management of asthma as part of a guideline on another health condition ▪ Are regional, local or hospital level ▪ Refer only to children/adolescents <16 years

▪ Criteria for referral, admission and or discharge for an acute asthma attack ▪ Medications to treat an acute asthma attack, including beta$_2$-agonists, corticosteroids, anti-cholinergics, magnesium, aminophylline, leukotriene receptor antagonists, and furosemide for an acute asthma attack ▪ Use of oxygen and heliox for an acute asthma attack ▪ Use of ventilation, including non-invasive ventilation and ECMO for an acute asthma attack ▪ Include a rating of the certainty or quality of evidence that underpins the recommendations using an approach such as GRADE[35, 36] ▪ Are novel guidelines or have been adapted from another guideline where an update of the evidence was conducted.	▪ Have been superseded by a more recent version ▪ Are adopted directly from another guideline if no updated searches were conducted during adoption ▪ Older than 2018 to ensure identified guidelines are applicable to current practice

2.4 Selection of eligible publications

All citations identified from the collective search strategy (see Appendix 1) will be exported to EndNote (Version 20) for reference management, where duplicates will be identified and removed. Using Covidence (www.covidence.org), two reviewers will independently review the titles and abstracts of the remaining citations to identify those for full-text review. The full texts will be obtained and independently evaluated by two reviewers applying the defined inclusion and exclusion criteria. Google Translate or Deepl Pro will be used to obtain translations of non-English language documents where appropriate. Where disagreements around eligibility occur, discussions will be held to reach consensus and, where necessary, a third reviewer will be involved. Citations excluded during the full-text review stage will be documented alongside the reason for their exclusion and included in a study flow diagram.

2.5 Data extraction and management

Data will be extracted from guidelines and peer-reviewed articles by one reviewer and checked for accuracy and omissions by a second. Where disagreements occur, discussions will be held to reach consensus and, where necessary, a third reviewer will be involved. Data extraction will be conducted in Microsoft Excel, using a purposefully designed data extraction form (Appendix 3). Data extraction will include the characteristics of the guideline, all relevant recommendations and their underlying evidence, including EtD[37] frameworks where provided. The data extraction form will be piloted and refined as necessary.

2.6 Quality appraisal

Two reviewers will independently assess the quality of included guidelines using the Appraisal of Guidelines for Research & Evaluation Global Rating Scale (AGREE GRS).[38] Scores will be

calculated and reported in accordance with the AGREE GRS manual,[39] including the average percentage score and the overall assessment score. Significant discrepancies for any domain will be discussed to reach consensus and, where necessary, reviewed by a third member of the research team.

2.7 Data synthesis

As the main data to be extracted for this review is descriptive in nature, a narrative synthesis of relevant guidelines, relevant recommendations, and their underlying evidence will be produced.

2.8 Currency of guidelines

Currency of the included guidelines will be assessed by reviewing the publication date of the guideline and the dates covered by the most recent evidence search, to ascertain whether the most current evidence has been included. If a significant number of relevant guidelines is returned following full-text review, currency and or quality will be used as thresholds for inclusion in the narrative summary.

3 References

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Appendix 1: Search strategy

Database: Medline via Ebscohost Run: 01/08/2024				
#	Query	Limiters/Expanders	Last Run Via	Results
S13	S3 AND S11	Limiters - Publication Date: 20180101-20241231 Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	851
S12	S3 AND S11	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	2,999
Concept 2: Guidelines (adapted from “CADTH Guidelines-Standard-Medline” Filter)				
S11	S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	328,722
S10	AU (guideline* or standards or consensus* or recommendat*)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	22,345
S9	CA (guideline* or standards or consensus* or recommendat*)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	6,728
S8	TI ((critical or clinical or practice) N2 (path or paths or pathway or pathways or protocol*))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	6,420

S7	TI (care N2 (path or paths or pathway or pathways or map or maps or plan or plans or standard))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	12,822
S6	TI (("practice parameter*" or "position statement*" or "policy statement*" or CPG or CPGs or "best practice*"))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	20,039
S5	TI (guideline* or standards or consensus* or recommendat*)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	263,072
S4	PT Consensus Development Conference Guideline OR PT Consensus Development Conference, NIH OR PT Guideline OR PT Practice Guideline	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	39,302
Concept 1: Asthma				
S3	S1 OR S2	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	208,951
S2	TI asthma* OR AB asthma*	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	187,061
S1	(MH "Asthma+")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	146,083

Appendix 2: Grey literature searches

Guideline Sites	URL
Agency for Healthcare Research and Quality, USA	https://www.ahrq.gov/prevention/guidelines
Alberta Health Sciences, Canada	https://www.albertahealthservices.ca/info/Page1730.aspx
All Wales Therapeutics and Toxicology Centre	https://awttc.nhs.wales/
American Academy of Family Physicians	https://www.aafp.org/
American Thoracic Society	https://site.thoracic.org/
American College of Chest Physicians	https://www.chestnet.org/
Andalusian Agency for Health Technology Assessment	http://www.aetsa.org/
Association of the Scientific Medical Societies, Germany	https://www.verwaltung.awmf.org/en/awmf.html
Belgian Health Care Knowledge Centre	https://kce.fgov.be/
BMJ Best Practice	https://bestpractice.bmj.com/info/
British Columbia Ministry of Health, Canada	https://www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/bc-guidelines
British Thoracic Society	https://www.brit-thoracic.org.uk/
Canadian Agency for Drugs and Technologies in Health	https://www.cadth.ca/
Canadian Medical Association Clinical Practice Guidelines Infobase	https://joulecma.ca/cpg/homepage
Canadian Task Force on Preventive Health Care	https://canadiantaskforce.ca/guidelines/published-guidelines/
Clinical Guidelines Committee of the American College of Physicians	https://www.acponline.org/
Danish Health Authority	https://www.sst.dk/en/national-clinical-guidelines/publications
Department of Health (including National Clinical Guidelines), Ireland	http://health.gov.ie
Department of Veterans Affairs and Department of Defense, US	https://www.healthquality.va.gov/
Estonian Health Insurance Fund, Estonia	https://www.tervisekassa.ee/en
European Network for Health Technology Assessment	https://www.eunethta.eu/
European Respiratory Society	https://www.ersnet.org/
Finnish Institute for Health and Welfare, Finland	https://thl.fi/fi/
Finnish Medical Society Duodecim	http://www.kaypahoito.fi
French National Authority for Health	https://www.has-sante.fr
Geneva Foundation for Medical Education and Research	https://www.gfmer.ch/000_Homepage_En.htm
German Institute of Medical Documentation and Information	https://www.dimdi.de/dynamic/en/dimdi/
Global Asthma Network	https://www.globalasthmanetwork.org/
Global Initiative for Asthma	https://ginasthma.org/

Guideline Sites	URL
Guideline International Network	https://g-i-n.net/
Guia Salud, Spain	https://portal.guiasalud.es/gpc/
Guideline Central	https://www.guidelinecentral.com/
Guidelines International Network international guideline library and registry of guidelines	https://g-i-n.net/international-guidelines-library
Health Council of the Netherlands	https://www.healthcouncil.nl/
Health Service Executive, Ireland	www.hse.ie
Institute for Clinical Systems Improvement, US	https://www.icsi.org/guideline/
Institute for Healthcare Improvement, US	http://www.ihi.org/
Japan Council for Quality Health Care	https://jcqhc.or.jp/en/
Lenus	www.lenus.ie
National Academy of Medicine, US	https://nam.edu/about-the-nam/
National Asthma Council Australia	https://www.nationalasthma.org.au/
National Board of Health and Welfare, Sweden	https://www.socialstyrelsen.se/en/regulations-and-guidelines/national-guidelines/
National Health and Medical Research Council Clinical Practice, Australian	https://nhmrc.gov.au/about-us/publications
National Heart Lung and Blood Institute (NHLBI)	https://www.nhlbi.nih.gov/
National Institute for Health and Care Excellence, England and Wales	http://www.nice.org.uk
New Zealand Guidelines Group	http://www.nzgg.org.nz
Norwegian Directorate of Health	https://www.helsedirektoratet.no/
Ontario Guidelines Advisory Committee Recommended Clinical Practice Guidelines	http://www.gacguidelines.ca
Public Health Agency of Sweden, Sweden	https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/
Primary Care Respiratory Society	https://www.pcrs-uk.org/
Ravijuhend, Estonia	https://www.ravijuhend.ee/
Scottish Intercollegiate Guidelines Network	www.sign.ac.uk
Singapore Ministry of Health	https://www.moh.gov.sg/
Socialstyrelsen (Health and Medical Care and Social Services), Sweden	https://www.socialstyrelsen.se/english
Swiss Centre for International Health	https://www.swisstph.ch/en/
The Best Practice Advocacy Centre New Zealand, New Zealand	https://bpac.org.nz/guidelines/
Trip Database	https://www.tripdatabase.com/
UpToDate	https://www.uptodate.com/
US Preventive Services Task Force	https://uspreventiveservicestaskforce.org/uspstf/
World Health Organization	www.who.int

Appendix 3: Data extraction template

Organisation and country	
Guideline title	
First published, last updated	
Key clinical questions	
Search dates	
Population(s)	
Overall setting(s)	
Topics covered in the guideline	
Recommendations, strength of recommendations and level of evidence	
Rating system used for recommendations	
Evidence to Decision process	

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Clinical Guideline Support

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