



SYSTEMATIC REVIEW

Pharmacology, Group-9



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Understanding the clinical outcomes of using inhalers comparing to nebulizers for treatment of asthma patient with Hypertension.



PICO

P- Asthmatic Patient with hypertension.

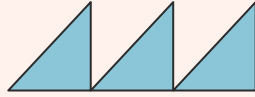
I - Inhalers.

C- Nebulizers.

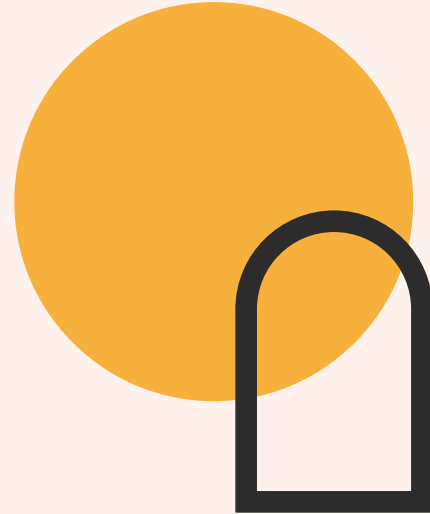
O- Clinical outcome in asthma management.


→ In patients with asthma, what are the clinical outcomes of using inhalers compare to nebulizers for treatment?

★ Patient / Problem, Intervention, Comparison & Outcome





ABSTRACT AND EXECUTIVE SUMMARY





Asthma and hypertension are common comorbidities, and managing these conditions concurrently presents unique challenges. This abstract provides a concise overview of clinical outcomes when using inhalers compared to nebulizers for asthma treatment in individuals with hypertension. Asthma is a prevalent respiratory condition, often coexisting with hypertension, a chronic cardiovascular condition. The choice of medication delivery device, whether inhalers or nebulizers, can significantly impact the clinical outcomes and safety of treatment for individuals dealing with both conditions. This abstract explores the implications of this choice. Studies comparing inhalers and nebulizers in asthma management for patients with coexisting hypertension were reviewed. Clinical effectiveness, safety, adherence, ease of use, and patient satisfaction were assessed. The findings suggest that both inhalers and nebulizers can effectively manage asthma symptoms in patients with hypertension. Safety profiles are generally comparable, with rare, mild adverse events. Adherence and ease of use may vary depending on individual patient abilities and preferences, emphasizing the need for patient education and training. Patient satisfaction is highly subjective, with no clear consensus. Individualized treatment plans that consider both asthma and hypertension are essential. Healthcare providers should prioritize patient education to ensure proper device use and maximize adherence. The choice between inhalers and nebulizers should align with individual patient needs. Shared decision-making and a holistic approach to treatment are crucial for optimizing clinical outcomes in this patient population. Further research may provide a deeper understanding of specific considerations for managing both conditions concurrently.

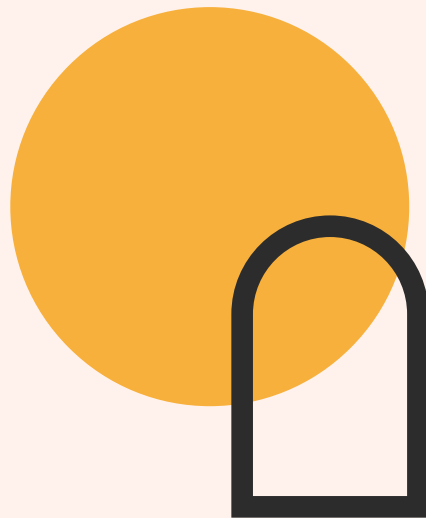
Keywords: - Inhaler, Nebulizer, Asthma treatment, Hypertension





01

INTRODUCTION





1. Asthma, a chronic respiratory condition, affects millions globally with airway inflammation, bronchoconstriction, and increased mucus.
2. Inhalers and nebulizers are common asthma treatment devices, crucial for symptom relief and management.
3. This systematic review assesses inhalers vs. nebulizers, examining efficacy, safety, and patient preferences for asthma treatment.
4. The goal is to provide comprehensive insights into the relative clinical outcomes of these two delivery methods.



BACKGROUND

- Asthma is a global concern, affecting around 235 million people.
- Managing asthma often involves bronchodilators, which can be delivered through inhalers (like MDIs and DPIs) or nebulizers. The choice between these methods is debated for factors like effectiveness, safety, ease of use, and patient satisfaction.
- A systematic review is needed to clarify the comparative benefits of inhalers and nebulizers in asthma management due to the rising prevalence of the disease.







RATIONALE

- This review addresses gaps in knowledge about inhalers vs. nebulizers for asthma treatment.
- It aims to provide evidence-based insights into their pros and cons.
- The information will help healthcare professionals, patients, and policymakers make informed choices.
- Tailoring treatment to individual needs and preferences is crucial.
- The review will enhance patient education and improve asthma management, ultimately enhancing the quality of life for asthma patients.

STATEMENT OF PROBLEM

This statement of problem highlights the need for a systematic review to comprehensively and rigorously compare the clinical outcomes of inhalers and nebulizers for asthma treatment.

- 
1. What is the comparative effectiveness of inhalers and nebulizers for the treatment of asthma in hypertension?
 2. What are the safety and tolerability profiles of inhalers and nebulizers?
 3. What are the patient preferences for inhalers and nebulizers?
- 

RESEARCH OBJECTIVES

- To compare the clinical effectiveness of inhalers and nebulizers for the treatment of asthma in hypertension.
- To compare the safety and tolerability of inhalers and nebulizers.
- To assess the patient preferences for inhalers and nebulizers.

SCOPE AND DELIMITATION

- This systematic review focuses on comparing inhalers and nebulizers as delivery devices for asthma treatment.
- The scope includes an in-depth examination of clinical outcomes, effectiveness, safety, patient adherence, ease of use, and patient satisfaction associated with the use of inhalers and nebulizers in managing asthma.
- The review will focus on the following outcomes: Asthma control, Symptom relief, Lung function, Quality of life, Adverse events, heart rate.
- The review will exclude studies that focus on specific types of asthma, such as severe asthma or exercise-induced asthma. The review will also exclude studies that focus on specific types of inhalers or nebulizers.

02

REVIEW OF LITERATURE



Epub 2020 Sep 25.

Metered-dose inhalers versus nebulization for the delivery of albuterol for acute exacerbations of wheezing or asthma in children: A systematic review with meta-analysis

Laura Payares-Salamanca ¹, Sandra Contreras-Arrieta ², Victor Florez-García ^{3, 4}, Alexander Barrios-Sanjuanelo ¹, Ivan Stand-Niño ⁵, Carlos E Rodriguez-Martinez ^{6, 7}

Affiliations + expand

PMID: 32940961 DOI: [10.1002/ppul.25077](#)

Abstract

Objectives: The benefits of metered-dose inhalers with a spacer (MDI+S) have increasingly been recognized as an alternative method of albuterol administration for treating pediatric asthma exacerbations. The aim of this systematic review was to compare the response to albuterol delivered through nebulization (NEB) with albuterol delivered through MDI+S in pediatric patients with asthma exacerbations.

doi: 10.1002/14651858.CD003898.pub6.

Inhaled magnesium sulfate in the treatment of acute asthma

Rachel Knightly ¹, Stephen J Milan, Rodney Hughes, Jennifer A Knopp-Sihota, Brian H Rowe, Rebecca Normansell, Colin Powell

Affiliations + expand

PMID: 29182799 PMCID: [PMC6485984](#) DOI: [10.1002/14651858.CD003898.pub6](#)

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Abstract

Background: Asthma exacerbations can be frequent and range in severity from mild to life-threatening. The use of magnesium sulfate (MgSO_4) is one of numerous treatment options available during acute exacerbations. While the efficacy of intravenous MgSO_4 has been demonstrated, the role of inhaled MgSO_4 is less clear.

Objectives: To determine the efficacy and safety of inhaled MgSO_4 administered in acute asthma.

doi: 10.1002/14651858.CD007524.pub5.

Increased versus stable doses of inhaled corticosteroids for exacerbations of chronic asthma in adults and children

Kayleigh M Kew ¹, Ella Flemyng ², Bradley S Quon ³, Clarus Leung ³

Affiliations [+ expand](#)

PMID: 36161875 PMCID: [PMC9512263](#) DOI: [10.1002/14651858.CD007524.pub5](#)

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Abstract

Background: People with asthma may experience exacerbations, or 'attacks', during which their symptoms worsen and additional treatment is required. Written action plans sometimes advocate a short-term increase in the dose of inhaled corticosteroids (ICS) at the first sign of an exacerbation to reduce the severity of the attack and to prevent the need for oral steroids or hospital admission.

Objectives: To compare the clinical effectiveness and safety of increased versus stable doses of ICS as part of a patient-initiated action plan for the home management of exacerbations in children and adults with persistent asthma.

doi: [10.1002/14651858.CD012286.pub2](#).

Interventions to improve inhaler technique for people with asthma

Rebecca Normansell ¹, Kayleigh M Kew ^{1 2}, Alexander G Mathioudakis ³

Affiliations + expand

PMID: [28288272](#) PMCID: [PMC6473469](#) DOI: [10.1002/14651858.CD012286.pub2](#)

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Abstract

Background: Asthma is a common chronic disease worldwide. Inhalers are often prescribed to help control asthma symptoms, improve quality of life and reduce the risk of exacerbations or flare-ups. However, evidence suggests that many people with asthma do not use their inhaler correctly. It is therefore important to evaluate whether interventions aimed specifically at improving technique are effective and safe, and whether use of these interventions translates into improved clinical outcomes.

Objectives: To assess the impact of interventions to improve inhaler technique on clinical outcomes and safety in adults and children with asthma.

doi: 10.1002/14651858.CD013518.pub2.

Combination fixed-dose beta agonist and steroid inhaler as required for adults or children with mild asthma

Iain Crossingham¹, Sally Turner¹, Sanjay Ramakrishnan^{2 3 4}, Anastasia Fries²,
Matthew Gowell⁵, Farhat Yasmin⁶, Rebekah Richardson¹, Philip Webb¹, Emily O'Boyle⁵,
Timothy Sc Hinks^{2 3}

Affiliations + expand

PMID: 33945639 PMCID: PMC8096360 DOI: 10.1002/14651858.CD013518.pub2

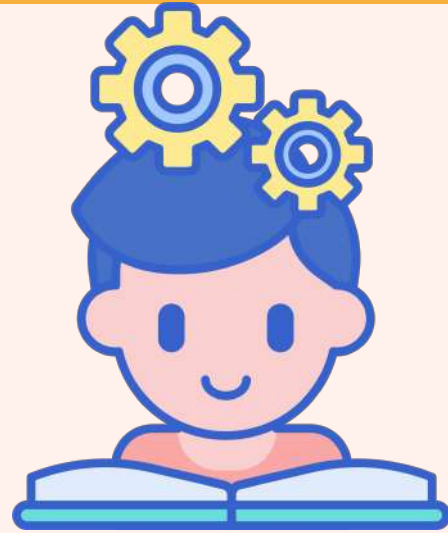
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Abstract

Background: Asthma affects 350 million people worldwide including 45% to 70% with mild disease. Treatment is mainly with inhalers containing beta₂-agonists, typically taken as required to relieve bronchospasm, and inhaled corticosteroids (ICS) as regular preventive therapy. Poor adherence to regular therapy is common and increases the risk of exacerbations, morbidity and mortality. Fixed-dose combination inhalers containing both a steroid and a fast-acting beta₂-agonist (FABA) in the same device simplify inhalers regimens and ensure symptomatic relief is accompanied by preventative therapy. Their use is established in moderate asthma, but they may also have potential utility in mild asthma.

03

RESEARCH METHOD



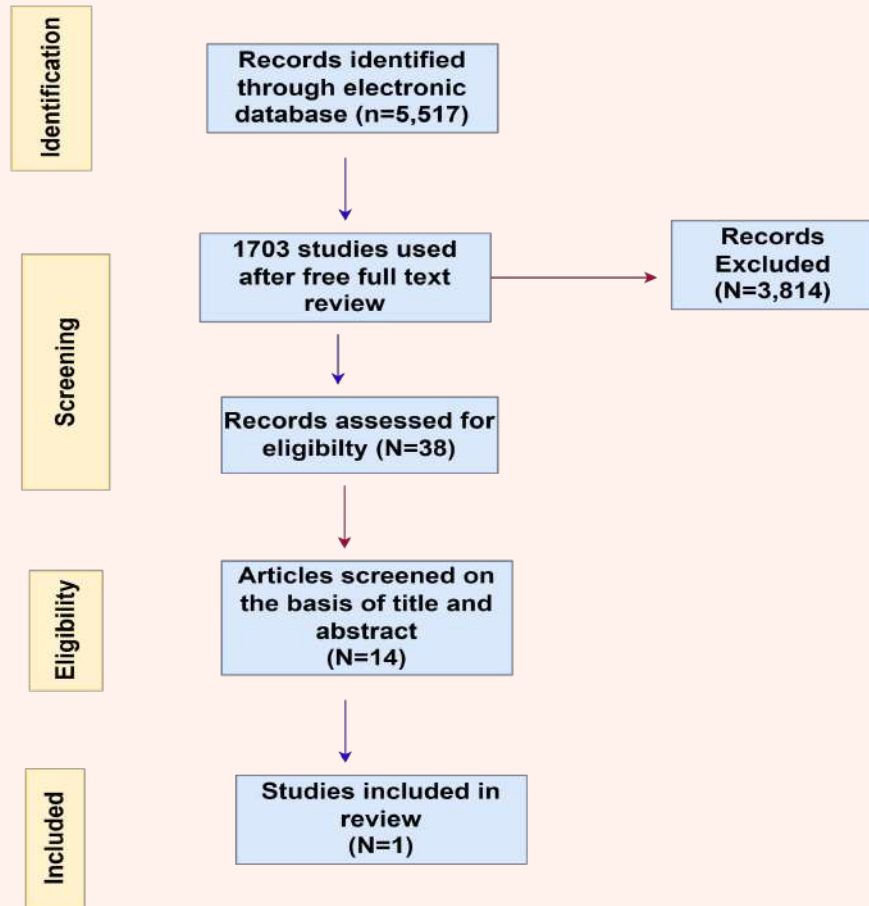
RESEARCH OBJECTIVES

The authors considered PubMed as the main database. In the PubMed database following search strategy was performed with search filter considering articles published in last 10 years and were Systematic Review. Asthma management, Inhalers and nebulizers, hypertension are keywords which are inserted in search bar for the researches.

Search	Query	Results
#1	Inhaler, Nebulizer, Asthma management, hypertension Filters: Full text, RCT, Last 10 years	38

STUDY SELECTION

- A total of 5,517 articles were identified through electronic search using PubMed.
- ◆ ● After adding filter free full text articles left with filter are 1703.
- ◆ ● After adding filter Systematic articles left with filters are 65.
- ◆ ● After adding filter of Last 10 years articles left with filter are 38.
- The remaining 38 articles were examined for eligibility and relevant to our topic and only 1 articles met the criteria.
- The inclusion criteria and were included in the Quantitative analysis. A PRISMA diagram is presented below to illustrate the screened, excluded and included studies.



PRISMA FLOW CHART





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Inhaler, Nebulizer, Asthma treatment, hypertension

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5,517 results

Page 1 of 552

RESULTS BY YEAR



TEXT AVAILABILITY:

- ☐ Abstract
- ☐ Free full text
- ☐ Full text

Inhaler Technique in Children With Asthma: A Systematic Review .
1 Gillette C, Rockich- Winston N, Kuhn JA, Flesher S, Shepherd M.
Acad Pediatr. 2016 Sep- Oct; 16(7): 605-15. doi: 10.1016/j.acap.2016.04.006. Epub 2016 Apr 26 .
Cite
PMID: 27130811 Review .
Share
BACKGROUND: Pediatric asthma is an important public health problem worldwide. The primary methods of medication delivery are inhalation devices. OBJECTIVES: This systematic review examined: 1) what is the prevalence of correct inhaler technique among children ...

The Impact of Inhaler Device Regimen in Patients with Asthma or COPD .
2 Usmani OS, Hickey AJ, Guranlioglu D, Rawson K, Stjepanovic N, Siddiqui S, Dhand R.
Cite
J Allergy Clin Immunol Pract. 2021 Aug; 9(8): 3033-3040.e1. doi: 10.1016/j.jaip.2021.04.024. Epub 2021 Apr 24 .
Share
PMID: 33901714 [Free article](#) [Review](#) ...

Inhaler, Nebulizer,
Asthma
treatment, hypertension

Limitations used: No
filter

PubMed: 5,517

Inhaler, Nebulizer,
Asthma treatment,
hypertension

Limitations used:
Free full text

PubMed: 1,703

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Inhaler, Nebulizer, Asthma treatment, hypertension

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1,703 results

RESULTS BY YEAR

1947 2024

TEXT AVAILABILITY

☐ Abstract

☐ Free full text

☐ Full text

Filters applied: Free full text. Clear all

☐ Single inhaler triple therapy(SITT) in asthma: Systematic review and practice implications .

1

Cite

Agusti A, Fabbri L, Lahousse L, Singh D, Papi A. Allergy. 2022 Apr; 77(4): 1105-1113. doi: 10.1111/ all.15076. Epub 2021 Sep 15. PMID: 34478578 Free PMC article. Review .

Share

inhale

☐ Critical inhaler errors in asthma and COPD: a systematic review of impact on health outcomes .

2



Inhaler, Nebulizer, Asthma treatment, hypertension

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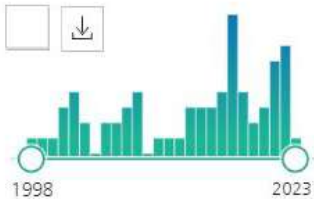
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65 results

<< < Page 1 of 7 > >>

RESULTS BY YEAR



TEXT AVAILABILITY

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☐ Full text

ARTICLE ATTRIBUTE

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Triple vs Dual Inhaler Therapy and Asthma Outcomes in Moderate to Severe

1 Asthma: A Systematic Review and Meta-analysis.

Cite Kim LHY, Saleh C, Whalen Browne A, O'Byrne PM, Chu DK.

Share JAMA. 2021 Jun 22; 325(24): 2466-2479. doi: 10.1001/ jama.2021.7872.

PMID: 34009257 Free PMC article.

OBJECTIVE: To systematically synthesize the outcomes and adverse events associated with triple therapy (ICS, LABA, and LAMA) vs dual therapy (ICS plus LABA) in children and adults with persistent uncontrolled asthma. ... CONCLUSIONS AND RELEVANCE: Among childr ...

Single inhaler triple therapy(SITT) in asthma: Systematic review and practice
2 implications.

Cite Agustí A, Fabbri L, Lahousse L, Singh D, Papi A.

Inhaler, Nebulizer,
Asthma treatment,
hypertension

Limitations used:
Free full text,
Systematic Review

PubMed: 65

Inhaler, Nebulizer,
Asthma treatment,
Hypertension

Limitations used:
Free full text,
Systematic Review,
Past 10
Years(2013-2023)

PubMed: 38

NIH National Library of Medicine
National Center for Biotechnology Information

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Inhaler, Nebulizer, Asthma treatment, hypertension

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RESULTS BY YEAR

2013 2023

TEXT AVAILABILITY

☐ Abstract

☒ Free full text

☐ Full text

38 results

Filters applied: Free full text, Systematic Review, in the last 10 years. [Clear all](#)

☐ Triple vs Dual **Inhaler Therapy** and **Asthma** Outcomes in Moderate to Severe **Asthma**: A Systematic Review and Meta-analysis.

1

Cite Kim LHY, Saleh C, Whalen-Browne A, O'Byrne PM, Chu DK.

Share JAMA. 2021 Jun 22;325(24):2466-2479. doi: 10.1001/jama.2021.7872.

PMID: 34009257 [Free PMC article.](#)

OBJECTIVE: To systematically synthesize the outcomes and adverse events associated with triple **therapy** (ICS, LABA, and LAMA) vs dual **therapy** (ICS plus LABA) in children and adults with persistent uncontrolled **asthma**. ...CONCLUSIONS AND RELEVANCE: Among childr ...

☐ Single **inhaler** triple **therapy** (SITT) in **asthma**: Systematic review and practice implications.

2

CRITERIA

Inclusion Criteria:-

- Patients with age group of both children and adults with the hypertension diagnosis.
- Comparison of hypertensive patients using Nebulizers and inhaler.
- Outcomes Efficiency, safety, cost effectiveness and Availability
- Test available in English language and free full text.

Exclusion Criteria:-

- Studies that include participants with other chronic lung diseases, such as chronic obstructive pulmonary disease (COPD). Studies that do not report clinical outcomes of interest

Methods: Data Extraction


Two reviewers will independently extract data from the included studies using a standardized data extraction form. The data extraction form will include information on the study design, participant characteristics, interventions, and outcomes. Any disagreements will be resolved by a third reviewer. We will extract the following data from the included studies: We developed a data extraction sheet

- Study characteristics (e.g., author, publication year, study design, sample size).....
- Hypertensive patient characteristics (e.g., age, sex, asthma severity)....
- Intervention (e.g., type of inhaler or nebulizer, medication dose)....
- Comparison (e.g., type of inhaler or nebulizer, medication dose)...
- Outcomes (e.g., asthma symptoms, exacerbations, lung function, quality of life)



04

RESULTS & DISCUSSION



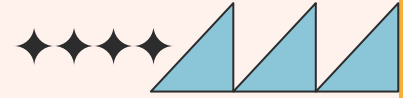
Metered-dose inhalers versus nebulization for the delivery of albuterol for acute exacerbations of wheezing or asthma in children: A systematic review with meta-analysis

Laura Payares-Salamanca, Sandra Contreras-Arrieta, Victor Florez-García, Alexander Barrios-Sanjuanelo, Ivan Stand-Niño, Carlos E Rodriguez-Martinez. 2020 Dec;55(12):3268-3278. doi: 10.1002/ppul.25077. Epub 2020 Sep 25

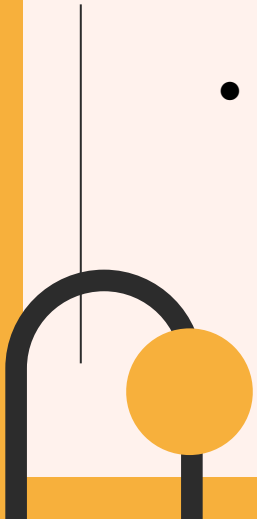
INTERVENTIONS	RESULTS
To study had to a randomized clinical trial comparing albuterol delivered via NEB versus MDI+S	significant reduction in the PIS(pulmonary index score) and a significantly smaller increase in HR when albuterol was delivered through MDI+S than when it was delivered through NEB.

05

SUMMARY & CONCLUSION



- The overall trend of the research suggests that there is no significant difference between inhalers and nebulizers in terms of effectiveness in improving lung function or reducing asthma symptoms in adults and children.
- Nebulizers may be more effective in relieving acute asthma attacks.
- It is important to note that the choice of inhaler or nebulizer should be made on a case-by-case basis, taking into account the individual patient's needs and preferences.
- Some factors to consider include the severity of the patient's asthma, the patient's ability to use an inhaler correctly, the patient's personal preference





06

—RECOMMENDATIONS

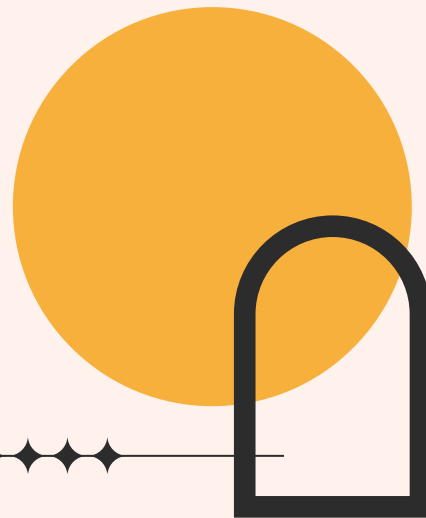


- This study will benefit future researchers to acquire knowledge about usage Inhaler & nebulizer in managing the asthma.
- Availability of literature on selected topics/Limited access to articles which centers on the research question paper.
- This study recommends that Prior to device selection, healthcare providers should assess the patient's ability to effectively use inhalers or nebulizers. This evaluation should consider patient age, coordination, inhalation ability, and personal preferences.



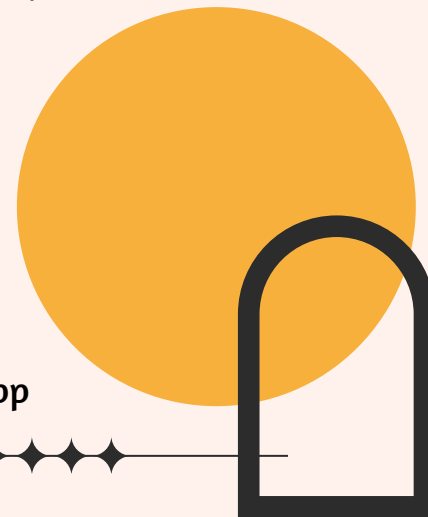
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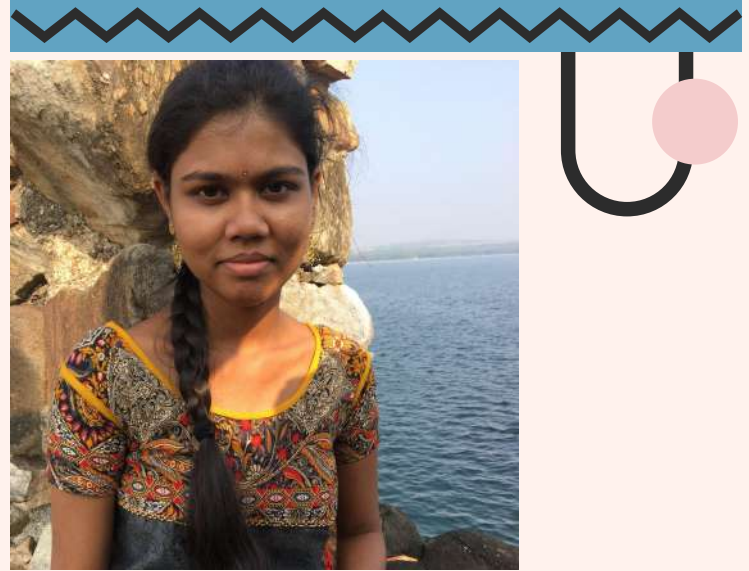
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Our team



JAYA SURYA



SARIKA SUHAS

Our team



LOKESH



AAGAM

Thanks

