Cochrane
Library

Cochrane Database of Systematic Reviews

Decongestants, antihistamines and nasal irrigation for acute sinusitis in children (Review)

Shaikh N, Wald ER

Shaikh N, Wald ER.
Decongestants, antihistamines and nasal irrigation for acute sinusitis in children.
Cochrane Database of Systematic Reviews 2014, Issue 10. Art. No.: CD007909.
DOI: [10.1002/14651858.CD007909.pub4](https://doi.org/10.1002/14651858.CD007909.pub4).

www.cochranelibrary.com

TABLE OF CONTENTS

HEADER	1
ABSTRACT	1
PLAIN LANGUAGE SUMMARY	1
BACKGROUND	3
OBJECTIVES	3
METHODS	3
RESULTS	5
Figure 1.	6
DISCUSSION	8
AUTHORS' CONCLUSIONS	8
ACKNOWLEDGEMENTS	8
REFERENCES	9
CHARACTERISTICS OF STUDIES	12
APPENDICES	14
WHAT'S NEW	16
HISTORY	16
CONTRIBUTIONS OF AUTHORS	17
DECLARATIONS OF INTEREST	17
SOURCES OF SUPPORT	17
DIFFERENCES BETWEEN PROTOCOL AND REVIEW	17
INDEX TERMS	17

[Intervention Review]

Decongestants, antihistamines and nasal irrigation for acute sinusitis in children

Nader Shaikh¹, Ellen R Wald²¹General Academic Pediatrics, Children's Hospital of Pittsburgh, Pittsburgh, PA, USA. ²Department of Pediatrics, University of Wisconsin School of Medicine and Public Health, Madison, WI, USA**Contact address:** Nader Shaikh, General Academic Pediatrics, Children's Hospital of Pittsburgh, 3414 Fifth Ave, Suite 301, Pittsburgh, PA, 15213, USA. Nader.Shaikh@chp.edu.**Editorial group:** Cochrane Acute Respiratory Infections Group.**Publication status and date:** New search for studies and content updated (no change to conclusions), published in Issue 10, 2014.**Citation:** Shaikh N, Wald ER. Decongestants, antihistamines and nasal irrigation for acute sinusitis in children. *Cochrane Database of Systematic Reviews* 2014, Issue 10. Art. No.: CD007909. DOI: [10.1002/14651858.CD007909.pub4](https://doi.org/10.1002/14651858.CD007909.pub4).

Copyright © 2014 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background

The efficacy of decongestants, antihistamines and nasal irrigation in children with clinically diagnosed acute sinusitis has not been systematically evaluated.

Objectives

To determine the efficacy of decongestants, antihistamines or nasal irrigation in improving symptoms of acute sinusitis in children.

Search methods

We searched CENTRAL (2014, Issue 5), MEDLINE (1950 to June week 1, 2014) and EMBASE (1950 to June 2014).

Selection criteria

We included randomized controlled trials (RCTs) and quasi-RCTs, which evaluated children younger than 18 years of age with acute sinusitis, defined as 10 to 30 days of rhinorrhea, congestion or daytime cough. We excluded trials of children with chronic sinusitis and allergic rhinitis.

Data collection and analysis

Two review authors independently assessed each study for inclusion.

Main results

Of the 662 studies identified through the electronic searches and handsearching, none met all the inclusion criteria.

Authors' conclusions

There is no evidence to determine whether the use of antihistamines, decongestants or nasal irrigation is efficacious in children with acute sinusitis. Further research is needed to determine whether these interventions are beneficial in the treatment of children with acute sinusitis.

PLAIN LANGUAGE SUMMARY

Decongestants, antihistamines and nasal irrigation for acute sinusitis in children

Review question

The goal of this review was to determine whether there is any evidence in the medical literature for or against the use of decongestants, antihistamines and nasal irrigation for acute sinusitis in children.

Background

Young children experience an average of six to eight colds per year. Out of every 10 children with a cold, one develops sinusitis. Sinusitis occurs when the sinuses, which do not drain properly during a cold, become secondarily infected with bacteria. Instead of getting better, children with sinusitis often have worsening or persistent cold symptoms. In order to alleviate the symptoms of sinusitis, parents and physicians often resort to using decongestants, antihistamines and nasal irrigation. These treatments are available without requiring a prescription and are widely used.

Previous studies have shown that the use of antihistamines and decongestants in children is associated with significant side effects.

Search date

The evidence is current to June 2014

Study characteristics

After a comprehensive review of the literature, we failed to identify any trials that evaluated the efficacy of these interventions (compared to no medication or placebo) in children with clinically diagnosed acute sinusitis.

Study funding sources

Not applicable.

Key results

No data are available to determine whether or not antihistamines or decongestants should be used in children with acute sinusitis.

Use of statistics

Not applicable.

Quality of evidence

Not applicable.

BACKGROUND

Description of the condition

Sinusitis is inflammation of the mucosal lining of one or more of the paranasal sinuses, secondary to bacterial infection (Meltzer 2004). Viral upper respiratory tract infection (URTI) and allergic rhinitis are risk factors for the development of secondary bacterial infection. Uncomplicated viral URIs generally last five to seven days and although respiratory symptoms may not have completely resolved by the 10th day, they have almost always peaked in severity and begun to improve (Pappas 2008; Wald 1991). The occurrence of a secondary bacterial infection usually manifests as a persistence or worsening of nasal and respiratory symptoms beyond what would be expected from a simple URTI. When symptoms have been present for more than 10 but fewer than 30 days, and are not improving, the term acute bacterial sinusitis (ABS) is used (AAPPG 2001).

Young children experience an average of six to eight viral URIs per year of which 6% to 13% are complicated by sinusitis (Wald 1991). Sinusitis accounts for 4% of all pediatric visits to primary care physicians (Nash 2002), and results in 7.9 million prescriptions annually. The maxillary and ethmoid sinuses are present at birth and expand rapidly by four years of age. The frontal sinuses develop from the anterior ethmoidal cells and become pneumatized beyond the 6th birthday. The sphenoid sinuses show aeration between three to five years of age. The peak incidence of sinusitis in children occurs between two to six years of age and among children attending daycare (Wald 1988).

The diagnosis of sinusitis is made using clinical criteria, and although imaging can be used to confirm the diagnosis, its routine use is not recommended (AAPPG 2001). The majority of children with persistent (more than 10 days) nasal symptoms (anterior or posterior nasal discharge, obstruction, congestion) with or without cough (not exclusively nocturnal), that have not improved, have a bacterial superinfection of their sinuses (Wald 1981).

Description of the intervention

The treatment of sinusitis in children remains controversial. Only four RCTs have examined the efficacy of antibiotics in the treatment of sinusitis and their results were conflicting (Garbutt 2001; Kristo 2005; Wald 1986; Wald 2009). In this review we focus on the efficacy of decongestants, antihistamines and nasal irrigation, with or without antibiotics, in improving the symptoms of sinusitis.

How the intervention might work

Antihistamines work by modifying the systemic histamine-mediated allergic response and decongestants work by constricting the blood vessels within the nasal cavity. Nasal irrigation loosens crusted secretions, mechanically removes them from the nasal cavity and may improve ciliary function (Talbot 1997). Antihistamines, decongestants and nasal irrigation may be effective in:

1. reducing the overall burden of symptoms; and/or
2. speeding up resolution of symptoms by promoting sinus drainage.

On the other hand, the use of antihistamines and decongestants, especially in young children, has been associated with significant

adverse effects (somnolence, irritability, insomnia, rhinitis medicamentosa, prolonged middle ear effusion, death) (CDC 2007; Meltzer 2004; Scadding 2008; Shefrin 2009). Irrigation with hypertonic solution, although generally well tolerated, can be associated with local irritation, burning and itching.

Why it is important to do this review

Decongestants, antihistamines and nasal irrigation are frequently used for the management of acute rhinitis. These treatments are widely available without requiring a prescription. Accordingly, it is important to review the evidence regarding the efficacy of these interventions.

OBJECTIVES

To determine the efficacy of decongestants, antihistamines or nasal irrigation in improving symptoms of acute sinusitis in children.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized controlled trials (RCTs) and quasi-RCTs.

Types of participants

We included trials that evaluated children 0 to 18 years of age with acute sinusitis, defined as 10 to 30 days of rhinorrhea, congestion or daytime cough. We included only trials that used imaging to diagnose sinusitis if children also met the above clinical criteria. We excluded trials in which the target population consisted of children with chronic sinusitis (symptoms for more than 30 days), allergic rhinitis or URIs. We did not exclude trials in which the target population consisted of children with acute sinusitis (as defined above), even if some of the included children had a history of allergic rhinitis. We excluded several studies in which the inclusion criteria were not adequately described. We excluded these studies because we could not determine the symptoms of children enrolled in the study and therefore we could not assess whether they would have been appropriate for this review.

Types of interventions

We considered studies examining the following interventions:

1. decongestants (oral or intranasal) versus placebo or no medication;
2. antihistamines (oral or intranasal) versus placebo or no medication;
3. decongestant and antihistamine combination versus placebo or no medication;
4. nasal irrigation versus no irrigation.

We did not consider nasal steroids as decongestants. Use of other concurrent medication, such as antibiotics and antipyretics, was allowed. We excluded trials involving surgery or sinus puncture because these interventions may significantly alter response to therapy.

Types of outcome measures

We focused the review on outcomes of importance to patients.

Primary outcomes

Theoretically, decongestants and antihistamines may be effective in promoting faster resolution of symptoms and reducing overall symptom burden. Accordingly, we examined both symptom resolution (improvement in symptom score from enrolment to day five) and overall symptom burden (as measured by average symptom scores while on therapy). Based on our clinical experience, most children remain highly symptomatic during the first 48 hours of treatment and most children become asymptomatic after eight days of therapy. Accordingly, we chose five days as the point in time at which the treatment effect, if any, would be most easily measurable.

1. Symptom resolution - improvement in symptom score from enrolment to day five (+/- three days).
2. Symptom burden - average symptom score while on therapy.

Secondary outcomes

1. Early clinical failure (at day five +/- three days).
2. Clinical cure at the end of therapy (at day 14 +/- four days).
3. Clinical failure at the end of therapy (at day 14 +/- four days).
4. Time to clinical cure.
5. Proportion of participants with progression or extension of disease resulting in additional medical therapy (complications).
6. Proportion of participants with adverse effects attributed to the treatment.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (2014, Issue 5) (accessed 12 June 2014), which includes the Acute Respiratory Infections Group's Specialized Register, MEDLINE (1950 to June week 1, 2014) and EMBASE (1950 to June 2014).

We searched CENTRAL and MEDLINE using the search strategy in [Appendix 1](#). We combined the search terms with a sensitive search strategy for identifying child studies based on the work of [Boluyt 2008](#). We combined the MEDLINE search with the Cochrane Highly Sensitive Search Strategy for finding randomized trials in MEDLINE: sensitivity- and precision-maximizing version (2008 revision); Ovid format ([Lefebvre 2011](#)). We adapted the search strategy for EMBASE (see [Appendix 2](#)). There were no language or publication restrictions. We used only English-language search terms.

Searching other resources

We reviewed the reference lists of the included studies and references cited in previously published Cochrane Reviews examining the efficacy of antihistamines, decongestants and irrigation in other populations ([Harvey 2007](#)).

Data collection and analysis

Selection of studies

Two review authors (NS, MP) independently determined which studies satisfied the inclusion criteria. We resolved differences by discussion.

Data extraction and management

We planned to abstract the following information for trials satisfying the inclusion criteria: study setting; source of funding; number of eligible children; clinical criteria used for inclusion or exclusion (minimum duration of symptoms, worsening or persistence of symptoms, history of asthma, history of allergic rhinitis, otitis media); types of outcome measure used (and maximum score if it was a symptom scale); time point(s) when outcome was measured; risk of bias (see below); numbers of participants randomized; dose and type of decongestant and/or antihistamine; method of irrigation; duration of therapy; co-interventions; reasons for withdrawals from study protocol (clinical, side effects, refusal and other); intention-to-treat (ITT) analyses and side effects of therapy.

Assessment of risk of bias in included studies

We planned to use the criteria listed below to determine trial quality and whether any of these components may have resulted in a high risk of bias ([Higgins 2011](#)).

1. Sequence generation.
2. Allocation concealment.
3. Blinding of participants, care providers and outcome assessors (for each outcome).
4. Incomplete outcome data.
5. Selective outcome reporting.

Measures of treatment effect

We planned to normalize symptom scores by dividing them by the maximum score for that scoring system. We had planned to calculate summary weighted risk ratios (RR), 95% confidence intervals (CI) and number needed to treat to benefit (NNTB) for dichotomous outcomes (for example, clinical failure).

Unit of analysis issues

We planned to use individual clinical trials as unit of analysis.

Assessment of heterogeneity

We planned to assess heterogeneity between studies by using the Chi² test for heterogeneity.

Assessment of reporting biases

We planned to use funnel plots to assess the potential for reporting bias.

Data synthesis

We planned to use the following analysis steps (subject to finding an adequate number of studies).

1. Pool normalized symptom scores using standardized mean difference.
2. Calculate summary-weighted RR and 95% CI for dichotomous secondary outcomes using the inverse variance method.
3. Calculate the numbers needed to treat to benefit using the summary odds ratio and the average control event rate.
4. Estimate the mean difference in outcomes.

Subgroup analysis and investigation of heterogeneity

We planned a priori subgroup analysis according to the following three variables:

1. age (less than two years);
2. history of allergic rhinitis;
3. type of intervention (i.e. specific medication).

Sensitivity analysis

We planned sensitivity analyses to assess the impact on the overall outcomes of the following potentially important factors:

1. risk of bias;

2. clinical criteria used for inclusion (whether symptoms of children in the trial were 'not improving' at the time of diagnosis);
3. other criteria used for inclusion (imaging tests);
4. analysis limited to participants managed 'per protocol'.

RESULTS

Description of studies

Results of the search

For this 2014 update we retrieved 136 records from the searches of the electronic databases. We identified no relevant articles. The result of our cumulative search was 662 studies of which we retrieved and reviewed 44 full-text articles ([Figure 1](#)).

Figure 1. Study flow diagram.

Figure 1. (Continued)

Included studies

No studies met all our inclusion criteria.

Excluded studies

Twelve studies contained data regarding the use of antihistamines or decongestants in adult participants (Adam 1998; Braun 1997; Inanli 2002; Luchikhin 1999; Meltzer 2000; Meltzer 2005; Murray 1971; Nayak 2002; Rabago 2002; Sederberg-Olsen 1989; Tesche 2008; Wiklund 1994).

Eleven studies did not use decongestants, antihistamines or irrigation (Barlan 1997; Careddu 1993; Fujihara 2004; Hynes 1989; Mann 1982; Meltzer 2000; Ovchinnikov 2009; Schmidt 1984; Simon 1997; Simon 1999; Tutkun 1996).

Eight studies enrolled children with chronic sinusitis (Bachmann 2000; Cuenant 1986; Culig 2010; Friedman 2006; Heatley 2001; Ottaviano 2011; Shoseyov 1998; Wei 2011).

Four studies could not be retrieved despite numerous attempts to locate them (Ozsoylu 1983; Seppey 1995; Topal 1990; Topal 2001).

One study enrolled children with allergic rhinitis who did not have acute sinusitis (Ciofalo 1991), and one study examined the efficacy of saline irrigation during the postoperative period (Maes 1987).

Seven studies were not controlled (i.e. there was no comparison group) (Businco 1981; Georgalas 2005; Michel 2005; Neffson 1968; Semczuk 1970; Vogt 1966; Yilmaz 2000), and one study was not randomized (Bogomil'skii 2004).

We excluded two studies because the children did not meet the clinical definition for acute sinusitis (McCormick 1996; Wang 2009).

In both studies, the minimum duration of symptoms was seven days. All enrolled children had radiographic changes (mucosal thickening). However, because X-rays are frequently positive in children with simple upper respiratory tract infections, many of the children included in these trials likely had a resolving upper respiratory infection.

The study by McCormick was a randomized, investigator- and participant-blinded, placebo-controlled trial that sought to evaluate the change in symptom scores of children with acute sinusitis treated with antihistamines and decongestant as compared to children treated with placebo (McCormick 1996). Sinusitis was defined by the presence of at least seven but less than 30 days of sinusitis symptoms in a child with radiological abnormalities of the maxillary sinuses, defined as ≥ 3 mm of mucosal thickening on at least one maxillary sinus. All 68 participants received oral antibiotics (amoxicillin at 40 mg/kg in three daily doses) for 14 days. The outcome was a non-validated symptom scale consisting of 12 symptoms. At entry, two points were assigned for each symptom present and the total score was obtained by summing the score for individual symptoms. Outcome was assessed on days three (by phone) and 14 (at the follow-up visit); three points were assigned for each symptom that had worsened, two points if the severity had remained the same, one point if it had improved, and 0 points if the symptom had resolved.

Children in the active treatment group received: 1) a nasal decongestant (0.05% oxymetazoline spray or drops depending on age) every 12 hours for three days, and 2) an oral antihistamine-decongestant syrup (brompheniramine-phenylpropanolamine) every eight hours for seven days. Participants randomized to placebo received intranasal saline drops plus an oral placebo. The absolute symptom scores on days three and 14, and the change of

symptoms from baseline did not differ between treatment groups. Time to symptom resolution, proportion cured and adverse events were not examined.

The RCT by Wang compared nasal irrigation with normal saline to no irrigation in 69 children three to 12 years of age with acute sinusitis (Wang 2009). Sinusitis was defined as more than seven days of purulent nasal discharge, cough or both in a child with radiographic findings of maxillary sinusitis. Participants with severe symptoms were excluded. Nasal irrigation was conducted using a disposable syringe filled with 15 to 20 mL of normal saline one to three times a day for the three weeks. Compliance was not monitored. Although both groups received standard treatment (antibiotics, mucolytics and nasal decongestants), it is unclear whether a standard regimen was used for the treatment in all participants, or whether the treatment plan was tailored according to the presenting symptoms. Symptoms were measured once a day using a non-validated symptom diary, which asked about the severity of eight symptoms. For each symptom, the burden was calculated by obtaining the mean score for that symptom over the one-week study period. Mean symptom scores for each symptom were compared between the two treatment groups (a total of 48 comparisons were conducted). Children in the irrigation group had less "daytime rhinorrhea," but more "night-time nasal congestion" than children in the no irrigation group. No data regarding time to symptom resolution, proportion cured and adverse events were presented.

Risk of bias in included studies

No studies fulfilled the criteria for inclusion. We did not exclude any studies on the grounds of poor methodology.

Effects of interventions

The effects of the interventions could not be determined because no studies met our inclusion criteria.

DISCUSSION

Summary of main results

There is no evidence to determine whether the use of antihistamines or decongestants is efficacious in children with acute sinusitis. Similarly, we did not find any evidence documenting the efficacy of nasal irrigation in children with acute sinusitis. The focus of this review was to determine whether decongestants, antihistamines and irrigation are effective

in children with acute sinusitis. Whether these interventions are effective in children with viral upper respiratory tract infection has been reviewed elsewhere (De Sutter 2012; Smith 2012). Two studies have attempted to address the question posed by this review (McCormick 1996; Wang 2009). However, because these studies included a large proportion of children with upper respiratory tract infections (URTIs), they were not included. Incidentally, neither study found any evidence to support the efficacy of the interventions of interest.

AUTHORS' CONCLUSIONS

Implications for practice

We found no evidence supporting the use of antihistamines or decongestants for children with acute sinusitis. Furthermore, there is growing evidence from observational studies and from randomized trials of these medications in children with other upper respiratory tract infections, which shows that the use of antihistamines and decongestants can lead to significant adverse events, especially in young children. Somnolence, irritability, insomnia, rhinitis medicamentosa, prolonged middle ear effusion and death have been associated with the use of these medications (CDC 2007; Chonmaitree 2003; Shefrin 2009). Accordingly, until further data from randomized controlled trials in children become available, the use of these medications is not recommended.

Similarly, there was no evidence to support the use of irrigation in children with acute sinusitis. Although irrigation in general is well tolerated, without data to support its efficacy its routine use cannot be recommended.

Implications for research

Further research is needed to determine whether these interventions are beneficial in the treatment of children with acute sinusitis. Development and validation of a symptom scale that can be used to track the symptoms of children with acute sinusitis will also be an important contribution.

ACKNOWLEDGEMENTS

The review authors wish to thank the following people for commenting on previous review drafts: Rani Abraham, David McCormick, Despina Contopoulos, Rick Shoemaker and Roger Damoiseaux. Mina Pi (MP) was responsible for searching and manuscript preparation and was an author on the previous versions of this review.

REFERENCES

References to studies excluded from this review

Adam 1998 {published data only}

Adam P, Stiffman M, Blake RLA. Clinical trial of hypertonic saline nasal spray in subjects with the common cold or rhinosinusitis. *Archives of Family Medicine* 1998;**7**:39-43.

Bachmann 2000 {published data only}

Bachmann G, Hommel G, Michel O. Effect of irrigation of the nose with isotonic salt solution on adult patients with chronic paranasal sinus disease. *European Archives of Otorhinolaryngology* 2000;**257**(10):537-41.

Barlan 1997 {published data only}

Barlan IB, Erkan E, Bakir M, Berrak S, Basaran MM. Intranasal budesonide spray as an adjunct to oral antibiotic therapy for acute sinusitis in children. *Annals of Allergy, Asthma, & Immunology* 1997;**78**(6):598-601.

Bogomil'skii 2004 {published data only}

Bogomil'skii MR, Garashenko TI, Shishmareva EV. Elimination therapy in the treatment of adenoiditis in children with acute sinusitis. *Vestnik Otorinolaringologii* 2004;**4**:46-8.

Braun 1997 {published data only}

Braun JJ, Alabert JP, Michel FB, Quiniou M, Rat C, Cougnard J, et al. Adjunct effect of loratadine in the treatment of acute sinusitis in patients with allergic rhinitis. *Allergy* 1997;**52**(6):650-5.

Businco 1981 {published data only}

Businco L, Fiore L, Frediani T, Artuso A, Di Fazio A, Bellioni P. Clinical and therapeutic aspects of sinusitis in children with bronchial asthma. *International Journal of Pediatric Otorhinolaryngology* 1981;**3**(4):287-94.

Careddu 1993 {published data only}

Careddu P, Bellosta C, Tonelli P, Boccazzi A. Efficacy and tolerability of brodimorprim in pediatric infections. *Journal of Chemotherapy* 1993;**5**(6):543-5.

Ciofalo 1991 {published data only}

Ciofalo AZG, Filiaci F, Vecchio AL, Grasso S. Study of the efficiency of astemizole as a supplementary agent in the treatment of apyretic inflammation of the paranasal sinuses: double-blind placebo study. *Perspectives in ENT Immunology* 1991;**5**(1):49-54.

Cuenant 1986 {published data only}

Cuenant G, Stipon JP, Plante-Longchamp G, Baudoin C, Guerrier Y. Efficacy of endonasal neomycin-tixocortol pivalate irrigation in the treatment of chronic allergic and bacterial sinusitis. *Journal of Oto-Rhino-Laryngology & its Related Specialties* 1986;**48**(4):226-32.

Culig 2010 {published data only}

Culig J, Leppee M, Vceva A, Djanic D. Efficiency of hypertonic and isotonic seawater solutions in chronic rhinosinusitis.

Medicinski Glasnik Ljekarske Komore Zenickodobojskog Kantona 2010;**7**(2):116-23.

Friedman 2006 {published data only}

Friedman M, Vidyasagar R, Joseph N. A randomized, prospective, double-blind study on the efficacy of dead sea salt nasal irrigations. *Laryngoscope* 2006;**116**(6):878-82.

Fujihara 2004 {published data only}

Fujihara K, Sakai A, Hotomi M, Yamanaka N. The effectiveness of nasal nebulizer therapy with cefmenoxime hydrochloride and nasal drops of povidone iodine for acute rhinosinusitis in children. *Practica Oto-Rhino-Laryngologica* 2004;**97**(7):599-604.

Georgalas 2005 {published data only}

Georgalas C, Thomas K, Owens C, Abramovich S, Lack G. Medical treatment for rhinosinusitis associated with adenoidal hypertrophy in children: an evaluation of clinical response and changes on magnetic resonance imaging. *Annals of Otolaryngology and Laryngology* 2005;**114**(8):638-44.

Heatley 2001 {published data only}

Heatley DG, McConnell KE, Kille TL, Levenson GE. Nasal irrigation for the alleviation of sinonasal symptoms. *Otolaryngology - Head and Neck Surgery* 2001;**125**:44-8.

Hynes 1989 {published data only}

Hynes B, Cole P, Forte V, Corey P, Smith CR. The evaluation of intranasal topical beclomethasone spray in the treatment of children with non-purulent rhinitis using rhinometric, cytologic and symptomatologic assessment. *Journal of Otolaryngology* 1989;**18**(4):151-4.

Inanli 2002 {published data only}

Inanli S, Ozturk O, Korkmaz M, Tutkun A, Batman C. The effects of topical agents of fluticasone propionate, oxymetazoline, and 3% and 0.9% sodium chloride solutions on mucociliary clearance in the therapy of acute bacterial rhinosinusitis in vivo. *Laryngoscope* 2002;**112**(2):320-5.

Luchikhin 1999 {published data only}

Luchikhin LA, Grigoriev SB, Stepanenko GI. Combined polydex with phenylephrine preparations in the treatment of patients with nasal and paranasal inflammation. *Vestnik Otorinolaringologii* 1999;**3**:48-9.

Maes 1987 {published data only}

Maes JJ, Clement PA. The usefulness of irrigation of the maxillary sinus in children with maxillary sinusitis on the basis of the Water's X-ray. *Rhinology* 1987;**25**(4):259-64.

Mann 1982 {published data only}

Mann W. Conservative therapy of sinusitis. *Zeitschrift fur Allgemeinmedizin* 1982;**58**(7):403-6.

McCormick 1996 {published data only}

McCormick DP, John SD, Swischuk LE, Uchida T. A double-blind, placebo-controlled trial of decongestant-antihistamine

for the treatment of sinusitis in children. *Clinical Pediatrics* 1996;**35**(9):457-60.

Meltzer 2000 {published data only}

Meltzer EO, Charous BL, Busse WW, Zinreich SJ, Lorber RR, Danzig MR. Added relief in the treatment of acute recurrent sinusitis with adjunctive mometasone furoate nasal spray. *Journal of Allergy and Clinical Immunology* 2000;**106**(4):630-7.

Meltzer 2005 {published data only}

Meltzer EO, Bachert C, Staudinger H. Treating acute rhinosinusitis: comparing efficacy and safety of mometasone furoate nasal spray, amoxicillin, and placebo. *Journal of Allergy and Clinical Immunology* 2005;**116**(6):1289-95.

Michel 2005 {published data only}

Michel O, Essers S, Heppt WJ, Johannssen V, Reuter W, Hommel G. The value of Ems Mineral Salts in the treatment of rhinosinusitis in children: prospective study on the efficacy of mineral salts versus xylometazoline in the topical nasal treatment of children. *International Journal of Pediatric Otorhinolaryngology* 2005;**69**(10):1359-65.

Murray 1971 {published data only}

Murray M. Treatment of sinusitis with a nitrofurazone-phenylephrine preparation. *Eye, Ear, Nose & Throat Monthly* 1971;**50**(2):62-6.

Nayak 2002 {published data only}

Nayak AS, Settipane GA, Pedinoff A, Charous BL, Meltzer EO, Busse WW, et al. Effective dose range of mometasone furoate nasal spray in the treatment of acute rhinosinusitis. *Annals of Allergy, Asthma and Immunology* 2002;**89**(3):271-8.

Neffson 1968 {published data only}

Neffson AH. A topical nasal decongestant for children. *Eye, Ear, Nose & Throat Monthly* 1968;**47**(3):121-3.

Ottaviano 2011 {published data only}

Ottaviano G, Marioni G, Staffieri C, Giacomelli L, Marchese-Ragona R, Bertolin A, et al. Effects of sulfurous, salty, bromic, iodine thermal water nasal irrigations in nonallergic chronic rhinosinusitis: a prospective, randomized, double-blind, clinical, and cytological study. *American Journal of Otolaryngology* 2011;**32**(3):235-9.

Ovchinnikov 2009 {published data only}

Ovchinnikov AI, Dzhenzhera GE, Lopatin AS. Efficiency of Sinuforte in combined therapy of acute suppurative rhinosinusitis. *Vestnik Otorinolaringologii* 2009;**5**:59-62.

Rabago 2002 {published data only}

Rabago D, Zgierska A, Mundt M, Barrett B, Bobula J, Maberry R. Efficacy of daily hypertonic saline nasal irrigation among patients with sinusitis: a randomized controlled trial. *Journal of Family Practice* 51;**12**:1049-55.

Schmidt 1984 {published data only}

Schmidt HJ, Lerche B, Jakel W. Results of maxillary sinus lavage in infants and small children. *Zeitschrift für Ärztliche Fortbildung (Jena)* 1984;**78**(22):949-51.

Sederberg-Olsen 1989 {published data only}

Sederberg-Olsen JF, Sederberg-Olsen AE. Intranasal sodium cromoglycate in post-catarhal hyperreactive rhinosinusitis: a double-blind placebo controlled trial. *Rhinology* 1989;**27**(4):251-5.

Semczuk 1970 {published data only}

Semczuk B, Klonowski S. Evaluation of the clinical usefulness of the antihistamine preparation HS-592 (Tavegil-Sandoz) in treatment of allergic rhinitis and sinusitis. *Polski Tygodnik Lekarski* 1970;**25**(8):303-5.

Shoseyov 1998 {published data only}

Shoseyov D, Bibi H, Shai P, Shoseyov N, Shazberg G, Hurvitz H. Treatment with hypertonic saline versus normal saline nasal wash of pediatric chronic sinusitis. *Journal of Allergy and Clinical Immunology* 1998;**101**(5):602-5.

Simon 1997 {published data only}

Simon MW. A prospective randomized study comparing the efficacy of amoxicillin-clavulanate, erythromycin-sulfisoxazole, cefaclor, and cefprozil in treating acute sinusitis of childhood. *Advances in Therapy* 1997;**14**(2):64-72.

Simon 1999 {published data only}

Simon MW. Treatment of acute sinusitis in childhood with cefbuten. *Clinical Pediatrics* 1999;**38**:269-72.

Tesche 2008 {published data only}

Tesche S, Metternich F, Sonnemann U, Engelke JC, Dethlefsen U. The value of herbal medicines in the treatment of acute non-purulent rhinosinusitis. Results of a double-blind, randomised, controlled trial. *European Archives of Otorhinolaryngology* 2008;**265**(11):1355-9.

Tutkun 1996 {published data only}

Tutkun A, Inanli S, Batman C, Uneri C, Sehitoglu MA. The impact of intranasal steroid as an adjunct to therapy for sinusitis. *Marmara Medical Journal* 1996;**9**(1):11-4.

Varricchio 2008 {published data only}

Varricchio A, Capasso M, di Gioacchino M, Ciprandi G. Inhaled thiamphenicol and acetylcysteine in children with acute bacterial rhinopharyngitis. *International Journal of Immunopathology and Pharmacology* 2880;**21**(3):625-9.

Vogt 1966 {published data only}

Vogt FC. Medical management of purulent rhinitis. A double-blind comparison of vasoconstrictor agent alone with a combination of vasoconstrictor and antimicrobial drugs. *Clinical Pediatrics* 1966;**5**(9):547-9.

Wang 2009 {published data only}

Wang YH, Yang CP, Ku MS, Sun HL, Lue KH. Efficacy of nasal irrigation in the treatment of acute sinusitis in children. *International Journal of Pediatric Otorhinolaryngology* 2009;**73**(12):1696-701.

Wei 2011 {published data only}

Wei JL, Sykes KJ, Johnson P, He J, Mayo MS. Safety and efficacy of once-daily nasal irrigation for the treatment of pediatric chronic rhinosinusitis. *Laryngoscope* 2011;**121**(9):1989-2000.

Wiklund 1994 {published data only}

Wiklund L, Stierna P, Berglund R, Westrin KM, Tonnesson M. The efficacy of oxymetazoline administered with a nasal bellows container and combined with oral phenoxymethylpenicillin in the treatment of acute maxillary sinusitis. *Acta Oto-Laryngologica. Supplement* 1994;**515**:57-64.

Yilmaz 2000 {published data only}

Yilmaz G, Varan B, Yilmaz T, Gurakan B. Intranasal budesonide spray as an adjunct to oral antibiotic therapy for acute sinusitis in children. *European Archives of Oto-Rhino-Laryngology* 2000;**257**(5):256-9.

References to studies awaiting assessment

Ozsoylu 1983 {published data only}

Ozsoylu S. [Otit ve maksiller sinuzit tedavisi]. *Pediatric Yenilikler. Turkiye Saglik ve Tedavi Vakft Dergisi* 1983:210-5.

Seppey 1995 {published data only}

Seppey M. [Rhinomer pour la therapie de la pathologie rhinosinuale]. *ORL Highlights* 1995;**2**:20-4.

Topal 1990 {published data only}

Topal B, Ozsoylu S. [Cocuklarda serum fizyolojik uygulanarak sinuzit tedavisi]. *Turkiye Ilac ve Tedavi Dergisi* 1990;**3**:445-9.

Topal 2001 {published data only}

Topal B, Ozsoylu S. Are antibiotics required for the treatment of acute sinusitis in children. *Yeni Tip Dergisi (Supplement)* 2001;**18**:58-60.

Additional references

AAPPG 2001

AAP Practice Guidelines. Clinical practice guideline: management of sinusitis. *Pediatrics* 2001;**108**(3):798-808.

Boluyt 2008

Boluyt N, Tjosvold L, Lefebvre C, Klassen TP, Offringa M. Usefulness of systematic review search strategies in finding child health systematic reviews in MEDLINE. *Archives of Pediatrics & Adolescent Medicine* 2008;**162**(2):111-6.

CDC 2007

Srinivasan A, Budnitz D, Shehab N. Infant deaths associated with cough and cold medications - two states, 2005. *MMWR* 2007;**56**:1-4.

Chonmaitree 2003

Chonmaitree T, Saeed K, Uchida T, Heikkinen T, Baldwin CD, Freeman DH Jr, et al. A randomized, placebo-controlled trial of the effect of antihistamine or corticosteroid treatment in acute otitis media. *Journal of Pediatrics* 2003;**143**:377-85.

De Sutter 2012

De Sutter AIM, van Driel ML, Kumar AA, Lesslar O, Skrt A. Oral antihistamine-decongestant-analgesic combinations for the common cold. *Cochrane Database of Systematic Reviews* 2012, Issue 2. [DOI: [10.1002/14651858.CD004976.pub3](https://doi.org/10.1002/14651858.CD004976.pub3)]

Garbutt 2001

Garbutt JM, Goldstein M, Gellman E, Shannon W, Littenberg B. A randomized, placebo-controlled trial of antimicrobial treatment for children with clinically diagnosed acute sinusitis. *Pediatrics* 2001;**107**(4):619-25.

Harvey 2007

Harvey R, Hannan SA, Badia L, Scadding G. Nasal saline irrigations for the symptoms of chronic rhinosinusitis. *Cochrane Database of Systematic Reviews* 2007, Issue 3. [DOI: [10.1002/14651858.CD006394.pub2](https://doi.org/10.1002/14651858.CD006394.pub2)]

Higgins 2011

Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions*. Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Kristo 2005

Kristo A, Uhari M, Luotonen J, Ilkko E, Koivunen P, Alho OP. Cefuroxime axetil versus placebo for children with acute respiratory infection and imaging evidence of sinusitis: a randomized, controlled trial. *Acta Paediatrica* 2005;**94**:1208-13.

Lefebvre 2011

Lefebvre C, Manheimer E, Glanville J. Chapter 6: Searching for studies. In: Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.

Meltzer 2004

Meltzer EO, Hamilos DL, Hadley JA, Lanza DC, Marple BF, Nicklas RA, et al. Rhinosinusitis: establishing definitions for clinical research and patient care. *Otolaryngology - Head and Neck Surgery* 2004;**131**(Suppl 6):1-62.

Nash 2002

Nash DR, Harman J, Wald ER, Kelleher KJ. Antibiotic prescribing by primary care physicians for children with upper respiratory tract infections. *Archives of Pediatrics & Adolescent Medicine* 2002;**156**(11):1114-9.

Pappas 2008

Pappas DE, Hendley JO, Hayden FG, Winther B. Symptom profile of common colds in school-aged children. *Pediatric Infectious Disease Journal* 2008;**27**:8-11.

Scadding 2008

Scadding G. Optimal management of nasal congestion caused by allergic rhinitis in children: safety and efficacy of medical treatments. *Paediatric Drugs* 2008;**10**(3):151-62.

Shefrin 2009

Shefrin AE, Goldman RD. Use of over-the-counter cough and cold medications in children. *Canadian Family Physician* 2009;**55**:1081-3.

Smith 2012

Smith SM, Schroeder K, Fahey T. Over-the-counter (OTC) medications for acute cough in children and adults in ambulatory settings. *Cochrane Database of Systematic Reviews* 2012, Issue 8. [DOI: [10.1002/14651858.CD001831.pub4](https://doi.org/10.1002/14651858.CD001831.pub4)]

Talbot 1997

Talbot AR, Herr TM, Parsons DS. Mucociliary clearance and buffered hypertonic saline solution. *Laryngoscope* 1997;**107**:500-3.

Wald 1981

Wald ER, Milmoie GJ, Bowen A, Ledesma-Medina J, Salamon N, Bluestone CD. Acute maxillary sinusitis in children. *New England Journal of Medicine* 1981;**304**(13):749-54.

Wald 1986

Wald ER, Chiponis D, Ledesma-Medina J. Comparative effectiveness of amoxicillin and amoxicillin-clavulanate potassium in acute paranasal sinus infections in children: a double-blind, placebo-controlled trial. *Pediatrics* 1986;**77**:795-800.

Wald 1988

Wald ER, Dashefsky B, Byers C, Guerra N, Taylor F. Frequency and severity of infections in day care. *Journal of Pediatrics* 1988;**112**(4):540-6.

Wald 1991

Wald ER. Purulent nasal discharge. *Pediatric Infectious Diseases Journal* 1991;**10**(4):329-33.

Wald 2009

Wald ER, Nash D, Eickhoff J. Effectiveness of amoxicillin/clavulanate potassium in the treatment of acute bacterial sinusitis in children. *Pediatrics* 2009;**124**(1):9-15.

References to other published versions of this review

Shaikh 2010

Shaikh N, Wald ER, Pi M. Decongestants, antihistamines and nasal irrigation for acute sinusitis in children. *Cochrane Database of Systematic Reviews* 2010, Issue 12. [DOI: [10.1002/14651858.CD007909.pub2](https://doi.org/10.1002/14651858.CD007909.pub2)]

Shaikh 2012

Shaikh N, Wald ER, Pi M. Decongestants, antihistamines and nasal irrigation for acute sinusitis in children. *Cochrane Database of Systematic Reviews* 2012, Issue 9. [DOI: [10.1002/14651858.CD007909.pub3](https://doi.org/10.1002/14651858.CD007909.pub3)]

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Adam 1998	Adult participants
Bachmann 2000	Chronic sinusitis
Barlan 1997	No decongestants or antihistamines used
Bogomil'skii 2004	Not a randomized study
Braun 1997	Adult participants
Businco 1981	No control group
Careddu 1993	No decongestants or antihistamines used
Ciofalo 1991	Allergic rhinitis
Cuenant 1986	Chronic sinusitis
Culig 2010	Chronic sinusitis
Friedman 2006	Chronic sinusitis
Fujihara 2004	No decongestants or antihistamines used

Study	Reason for exclusion
Georgalas 2005	No control group
Heatley 2001	Chronic sinusitis
Hynes 1989	No decongestants or antihistamines used
Inanli 2002	Adult participants
Luchikhin 1999	Adult participants
Maes 1987	Pre/postoperative children
Mann 1982	No decongestants or antihistamines used
McCormick 1996	Does not meet criteria for acute sinusitis
Meltzer 2000	Adult participants
Meltzer 2005	Adult participants
Michel 2005	No control group
Murray 1971	Adult participants
Nayak 2002	Adult participants
Neffson 1968	No control group
Ottaviano 2011	Chronic sinusitis
Ovchinnikov 2009	No decongestants or antihistamines used (herbal preparation)
Rabago 2002	Adult participants
Schmidt 1984	No decongestants or antihistamines used
Sederberg-Olsen 1989	Adult participants
Semczuk 1970	No control group
Shoseyov 1998	Chronic sinusitis
Simon 1997	No decongestants or antihistamines used
Simon 1999	No decongestants or antihistamines used
Tesche 2008	Adult participants
Tutkun 1996	No decongestants or antihistamines used
Varricchio 2008	Not a randomized study
Vogt 1966	No control group
Wang 2009	Does not meet criteria for sinusitis

Study	Reason for exclusion
Wei 2011	Chronic sinusitis
Wiklund 1994	Adult participants
Yilmaz 2000	No control group

APPENDICES

Appendix 1. MEDLINE search strategy

MEDLINE (OVID)

```

1 exp Sinusitis/
2 sinusit*.tw.
3 (rhinosinusit* or nasosinusit*).tw.
4 Paranasal Sinus Diseases/
5 (sinus* adj2 infect*).tw.
6 (nasal adj2 (discharge* or congest*)).tw.
7 Nasopharyngitis/
8 (nasopharyngit* or rhinopharyngit*).tw.
9 ((purulent or acute) adj2 rhinit*).tw.
10 (rhinorrhea* or rhinorrhoea*).tw.
11 or/1-10 (26368)
12 exp Histamine H1 Antagonists/
13 antihistamine*.tw,nm.
14 azelastine.tw,nm.
15 brompheniramine.tw,nm.
16 chlorpheniramine.tw,nm.
17 diphenhydramine.tw,nm.
18 loratadine.tw,nm.
19 pheniramine.tw,nm.
20 promethazine.tw,nm.
21 terfenadine.tw,nm.
22 triprolidine.tw,nm.
23 exp Nasal Decongestants/
24 decongestant*.tw,nm.
25 cetirizine.tw,nm.
26 ephedrine.tw,nm.
27 norephedrine.tw,nm.
28 oxymetazoline.tw,nm.
29 phenylephrine.tw,nm.
30 phenylpropanolamine.tw,nm.
31 pseudoephedrine.tw,nm.
32 xylometazoline.tw,nm.
33 fexofenadine.tw,nm.
34 (levmetamfetamine or levomethamphetamine or l-methamphetamine).tw,nm.
35 clemastine.tw,nm.
36 doxylamine.tw,nm.
37 desloratidine.tw,nm.
38 levocetirizine.tw,nm.
39 hydroxyzine.tw,nm.
40 carbinoxamine.tw,nm.
41 dexchlorpheniramine.tw,nm.
42 Cromolyn Sodium/
43 cromolyn.tw,nm.
44 saline.tw,nm.

```


45 Sodium Chloride/
 46 sodium chloride.tw,nm.
 47 hypertonic solutions/ or saline solution, hypertonic/
 48 Seawater/
 49 (seawater or sea water or ocean).tw.
 50 (saltwater or salt water).tw.
 51 Isotonic Solutions/
 52 isotonic.tw.
 53 (wash* or spray* or mist* or irrigat* or rins* or douch* or lavage*).tw.
 54 Nasal Lavage/
 55 acrivastine.tw,nm.
 56 astemizole.tw,nm.
 57 azatadine maleate.tw,nm.
 58 bepotastine.tw,nm.
 59 carbinoxamine maleate.tw,nm.
 60 cyproheptadine hydrochloride.tw,nm.
 61 dimetindene maleate.tw,nm.
 62 diphenhydramine.tw,nm.
 63 epinastine hydrochloride.tw,nm.
 64 homochlorcyclizine hydrochloride.tw,nm.
 65 ketotifen fumarate.tw,nm.
 66 levocabastine hydrochloride.tw,nm.
 67 mebhydrolin.tw,nm.
 68 mequitazine.tw,nm.
 69 mizolastine.tw,nm.
 70 oxatomide.tw,nm.
 71 phenindamine tartrate.tw,nm.
 72 rupatadine.tw,nm.
 73 tritoqualine.tw,nm.
 74 (amidefrine mesilate or amidefrine mesylate).tw,nm.
 75 clonazoline hydrochloride.tw,nm.
 76 fenoxazoline.tw,nm.
 77 indanazoline.tw,nm.
 78 metizoline.tw,nm.
 79 naphazoline.tw,nm.
 80 methoxyphenamine.tw,nm.
 81 xylometazoline.tw,nm.
 82 tymazoline.tw,nm.
 83 tuaminoheptane.tw,nm.
 84 ebastine.tw,nm.
 85 emadastine.tw,nm.
 86 methylephedrine.tw,nm.
 87 tetrazyoline.tw,nm.
 88 tramazoline.tw,nm.
 89 or/12-88
 90 11 and 89

Appendix 2. Embase.com search strategy

#31 #11 AND #24 AND #27 AND #30 523
 #30 #28 OR #29 910535
 #29 random*:ab,ti OR placebo*:ab,ti OR factorial*:ab,ti OR crossover*:ab,ti OR 'cross over':ab,ti OR 'cross-over':ab,ti OR volunteer*:ab,ti
 OR assign*:ab,ti OR allocat*:ab,ti AND [embase]/lim 872935
 #28 'randomized controlled trial'/exp OR 'single blind procedure'/exp OR 'crossover procedure'/exp AND [embase]/lim 234353
 #27 #25 OR #261919638
 #26 infant*:ab,ti OR infancy:ab,ti OR newborn*:ab,ti OR baby*:ab,ti OR babies:ab,ti OR neonat*:ab,ti OR preterm*:ab,ti OR prematur*:ab,ti
 OR child*:ab,ti OR schoolchild*:ab,ti OR preschool*:ab,ti OR kid:ab,ti OR kids:ab,ti OR toddler*:ab,ti OR adoles*:ab,ti OR teen*:ab,ti OR
 boy*:ab,ti OR girl*:ab,ti OR minor*:ab,ti OR pubert*:ab,ti OR pubescen*:ab,ti OR pediatric*:ab,ti OR paediatric*:ab,ti OR (school* NEAR/1
 (nursery OR primary OR secondary OR high OR elementary)):ab,ti OR kindergar*:ab,ti OR highschool*:ab,ti OR 'school age':ab,ti OR 'school
 ages':ab,ti OR 'school aged':ab,ti AND [embase]/lim 1471230
 #25 'infant'/exp OR 'child'/exp OR 'adolescent'/exp OR 'puberty'/de OR 'pediatrics'/exp OR 'school'/de OR 'kindergarten'/de OR 'nursery
 school'/de OR 'primary school'/de OR 'middle school'/de OR 'high school'/de AND [embase]/lim 1197106

#24 #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 564106
#23 acrivastine:ab,ti OR astemizole:ab,ti OR 'azatadine maleate':ab,ti OR bepotastine:ab,ti OR 'carbinoxamine maleate':ab,ti OR 'ciproheptadine hydrochloride':ab,ti OR 'dimetindene maleate':ab,ti OR diphenhydramine:ab,ti OR 'epinastine hydrochloride':ab,ti OR 'homochlorcyclizine hydrochloride':ab,ti OR 'ketotifen fumarate':ab,ti OR 'levocabastine hydrochloride':ab,ti OR mebhydrolin:ab,ti OR mequitazine:ab,ti OR mizolastine:ab,ti OR oxatamide:ab,ti OR 'phenindamine'/de AND tartrate:ab,ti OR rupatadine:ab,ti OR tritoqualine:ab,ti OR 'amidefrine mesilate':ab,ti OR 'amidefrine mesylate':ab,ti OR 'clonazoline hydrochloride':ab,ti OR fenoxazoline:ab,ti OR indanazoline:ab,ti OR metizoline:ab,ti OR naphazoline:ab,ti OR methoxyphenamine:ab,ti OR xylometazoline:ab,ti OR tymazoline:ab,ti OR tuaminoheptane:ab,ti OR ebastine:ab,ti OR emadastine:ab,ti OR methylephedrine:ab,ti OR tetrazyline:ab,ti OR tramazoline:ab,ti AND [embase]/lim 1172
#22 'nasal lavage'/de AND [embase]/lim 230
#21 seawater:ab,ti OR 'sea water':ab,ti OR ocean:ab,ti OR saltwater:ab,ti OR 'salt water':ab,ti OR isotonic:ab,ti OR wash*:ab,ti OR spray*:ab,ti OR mist*:ab,ti OR irrigat*:ab,ti OR rins*:ab,ti OR douch*:ab,ti OR lavage*:ab,ti AND [embase]/lim 200323
#20 'hypertonic solution'/de OR 'isotonic solution'/de OR 'sea water'/de AND [embase]/lim 13455
#19 saline:ab,ti OR 'sodium chloride':ab,ti AND [embase]/lim 131527
#18 'sodium chloride'/de AND [embase]/lim 87254
#17 cromolyn:ab,ti AND [embase]/lim 1248
#16 'cromoglycate disodium'/de AND [embase]/lim 13135
#15 decongestant*:ab,ti OR decongestiv*:ab,ti OR cetirizine:ab,ti OR ephedrine:ab,ti OR norephedrine:ab,ti OR oxymetazoline:ab,ti OR phenylephrine:ab,ti OR phenylpropanolamine:ab,ti OR pseudoephedrine:ab,ti OR xylometazoline:ab,ti OR fexofenadine:ab,ti OR levmetamfetamine:ab,ti OR levomethamphetamine:ab,ti OR clemastine:ab,ti OR doxylamine:ab,ti OR desloratidine:ab,ti OR levocetirizine:ab,ti OR hydroxyzine:ab,ti OR carbinoxamine:ab,ti OR dexchlorpheniramine:ab,ti OR 'l-methamphetamine':ab,ti AND [embase]/lim 24591
#14 'decongestive agent'/exp AND [embase]/lim 78794
#13 antihistamin*:ab,ti OR azelastine:ab,ti OR brompheniramine:ab,ti OR chlorpheniramine:ab,ti OR diphenhydramine:ab,ti OR loratadine:ab,ti OR pheniramine:ab,ti OR promethazine:ab,ti OR terfenadine:ab,ti OR triprolidine:ab,ti AND [embase]/lim 17698
#12 'antihistaminic agent'/exp AND [embase]/lim 141245
#11 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 33388
#10 rhinorrhea:ab,ti OR rhinorrhoea:ab,ti AND [embase]/lim 3218
#9 ((purulent OR acute) NEAR/2 rhinit*):ab,ti AND [embase]/lim 207
#8 nasopharyngit*:ab,ti OR rhinopharyngit*:ab,ti AND [embase]/lim 606
#7 'rhinopharyngitis'/de AND [embase]/lim 4132
#6 (nasal NEAR/2 (discharg* OR congest*)):ab,ti AND [embase]/lim 2603
#5 'nose congestion'/de AND [embase]/lim 4796
#4 (sinus NEAR/2 infect*):ab,ti AND [embase]/lim 622
#3 'sinus congestion'/de OR 'sinus pain'/de OR 'sinus headache'/exp AND [embase]/lim 307
#2 sinusit*:ab,ti OR rhinosinusit*:ab,ti OR nasosinusit*:ab,ti AND [embase]/lim 12654
#1 'sinusitis'/exp AND [embase]/lim 19785

WHAT'S NEW

Date	Event	Description
12 June 2014	New citation required but conclusions have not changed	The conclusions remain unchanged.
12 June 2014	New search has been performed	Searches conducted. No new trials were included.

HISTORY

Protocol first published: Issue 3, 2009
Review first published: Issue 12, 2010

Date	Event	Description
31 January 2012	New citation required but conclusions have not changed	The conclusions remain unchanged.
31 January 2012	New search has been performed	Searches conducted. No new trials were included. Four new trials were excluded (Culig 2010 ; Ottaviano 2011 ; Ovchinnikov 2009 ; Wei 2011).

CONTRIBUTIONS OF AUTHORS

Nader Shaikh (NS) was responsible for protocol development, searching, data interpretation and manuscript preparation. Ellen R Wald (ERW) was responsible for protocol development and manuscript preparation.

DECLARATIONS OF INTEREST

Nader Shaikh: none known.
Ellen R Wald: none known.

SOURCES OF SUPPORT

Internal sources

- Departmental funds, USA.

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The names of several decongestants and antihistamines were added to the search strategy after the protocol was published.

INDEX TERMS

Medical Subject Headings (MeSH)

*Nasal Lavage; Acute Disease; Combined Modality Therapy [methods]; Histamine Antagonists [*therapeutic use]; Nasal Decongestants [*therapeutic use]; Sinusitis [*therapy]

MeSH check words

Adolescent; Child; Humans