Corticosteroids for treatment of sore throat: systematic review and meta-analysis of randomised trials

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Abstract

Objective To estimate the benefits and harms of using corticosteroids as an adjunct treatment for sore throat. Design Systematic review and meta-analysis of randomised control trials. Data sources Medline, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), trial registries up to May 2017, reference lists of eligible trials, related reviews. Study selection Randomised controlled trials of the addition of corticosteroids to standard clinical care for patients aged 5 or older in emergency department and primary care settings with clinical signs of acute tonsillitis, pharyngitis, or the clinical syndrome of sore throat. Trials were included irrespective of language or publication status. Review methods Reviewers identified studies, extracted data, and assessed the quality of the evidence, independently and in duplicate. A parallel guideline committee (BMJ Rapid Recommendation) provided input on the design and interpretation of the systematic review, including the selection of outcomes important to patients. Random effects model was used for meta-analyses. Quality of evidence was assessed with the GRADE [...]
Corticosteroids for treatment of sore throat: systematic review and meta-analysis of randomised trials

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ABSTRACT

OBJECTIVE
To estimate the benefits and harms of using corticosteroids as an adjunct treatment for sore throat.

DESIGN
Systematic review and meta-analysis of randomised control trials.

DATA SOURCES
Medline, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), trial registries up to May 2017, reference lists of eligible trials, related reviews.

STUDY SELECTION
Randomised controlled trials of the addition of corticosteroids to standard clinical care for patients aged 5 or older in emergency department and primary care settings with clinical signs of acute tonsillitis, pharyngitis, or the clinical syndrome of sore throat. Trials were included irrespective of language or publication status.

REVIEW METHODS
Reviewers identified studies, extracted data, and assessed the quality of the evidence, independently and in duplicate. A parallel guideline committee (BMJ Rapid Recommendation) provided input on the design and interpretation of the systematic review, including the selection of outcomes important to patients. Random effects model was used for meta-analyses. Quality of evidence was assessed with the GRADE approach.

RESULTS
10 eligible trials enrolled 1426 individuals. Patients who received single low dose corticosteroids (the most common intervention was oral dexamethasone with a maximum dose of 10 mg) were twice as likely to experience pain relief after 24 hours (relative risk 2.2, 95% confidence interval 1.2 to 4.3; risk difference 12.4%; moderate quality evidence) and 1.5 times more likely to have no pain at 48 hours (1.5, 1.3 to 1.8; risk difference 18.3%; high quality). The mean time to onset of pain relief in patients treated with corticosteroids was 4.8 hours earlier (95% confidence interval −1.9 to −7.8; moderate quality) and the mean time to complete resolution of pain was 11.1 hours earlier (−0.4 to −21.8; low quality) than in those treated with placebo. The absolute pain reduction at 24 hours (visual analogue scale 0-10) was greater in patients treated with corticosteroids (mean difference 1.3, 95% confidence interval 0.7 to 1.9; moderate quality). Nine of the 10 trials sought information regarding adverse events. Six studies reported no adverse effects, and three studies reported few adverse events, which were mostly complications related to disease, with a similar incidence in both groups.

CONCLUSION
Single low dose corticosteroids can provide pain relief in patients with sore throat, with no increase in serious adverse effects. Included trials did not assess the potential risks of larger cumulative doses in patients with recurrent episodes of acute sore throat.

SYSTEMATIC REVIEW REGISTRATION
PROSPERO CRD42017067808.

Introduction
Sore throat is among the most common presenting complaints in both emergency departments and outpatient care settings. It is the cause of about 5% of medical visits in children and about 2% of all outpatient visits in adults.1-3 The most common cause of sore throat is acute pharyngitis caused by self limiting viral infections. Pain management with paracetamol (acetaminophen) or non-steroidal anti-inflammatory drugs (NSAIDs) therefore represents the mainstay of care.4 5 These drugs provide limited pain relief but also sometimes cause serious harm.6 7 Treatment of sore throat with antibiotics also provides modest benefit in reduction of symptoms and fever when the infection is bacterial, but their use could contribute to antibiotic resistance.8 9 Although most cases of sore throat have a viral aetiology, and the risk of secondary complications is low, clinicians commonly prescribe antibiotics.4 10 Though this could be because clinicians think that patients seeking care expect a course of antibiotics, in reality pain relief might be more important to them.10 Corticosteroids represent an additional therapeutic option for symptom relief. Randomised control trials...
suggest that a short course of low-to-moderate dose corticosteroids probably provides symptomatic benefit to patients with sore throat.\textsuperscript{11,16} Despite this evidence, clinicians do not commonly use steroids. Reasons might include uncertain applicability of the evidence to patients with less severe disease, as the initial studies enrolled only patients with severe sore throat presenting to emergency departments, almost all of whom received antibiotics.

This systematic review is part of the BMJ Rapid Recommendations project, a collaborative effort from the MAGIC research and innovation programme (www.magicproject.org) and BMJ. The aim of the project is to respond to new potentially practice changing evidence and provide a trustworthy practice guideline in a timely manner.\textsuperscript{15} In this case, the stimulus was the recent TOAST (Treatment Options without Antibiotics for Sore Throat) trial, which randomised over 500 patients with sore throat presenting to their primary care clinician who were not initially prescribed antibiotics; the TOAST authors reported beneficial effects of corticosteroids.\textsuperscript{16} In the light of this new potentially practice changing evidence, we updated the latest Cochrane review\textsuperscript{14} dealing with the effectiveness and safety of corticosteroids as an adjunct treatment for sore throat in addition to standard care compared with standard care alone. This systematic review informed the parallel guideline published in a multi-layered electronic format on bmj.com\textsuperscript{17} and MAGICApp (https://www.magicapp.org/goto/guideline/JjXYAL/section/j79pvn).

**Methods**

**Guideline panel and patient involvement**

According to the BMJ Rapid Recommendations process,\textsuperscript{15} a guideline panel provided critical oversight to the review and identified populations, subgroups, and outcomes of interest. The panel included clinicians, methodologists, and patients with experience of sore throat. Patients received personal training and support to optimise contributions throughout the guideline development process. The patients on the panel led the interpretation of the results based on what they expected the typical patient values and preferences to be, as well as the variation between patients. Five patient representatives were full members of the guideline panel and contributed to the selection and prioritisation of outcomes, values and preferences assessments, and critical feedback to the protocol for the systematic review and the BMJ Rapid Recommendations manuscript.

**Search strategy**

We searched Medline, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL) for relevant published randomised controlled trials based on the strategy reported in the most recent Cochrane systematic review,\textsuperscript{12} modified under the guidance of a research librarian (appendix 1). We limited the search from 1 January 2010, which included a two month overlap with the previous Cochrane review search,\textsuperscript{12} to 1 May 2017. There were no language restrictions.

We reviewed reference lists from eligible new trials and related reviews for additional eligible trials and searched ClinicalTrials.gov for ongoing or unpublished trials and for additional data from published trials.

**Study selection**

Reviewers (BS, RACS, DP, RBP) independently and in duplicate screened the titles and abstracts of all identified studies using a priori selection criteria. Subsequently, the same reviewers independently assessed eligibility of the full texts of potentially eligible studies. Reviewers resolved discrepancies through discussion or, if needed, by adjudication from a third reviewer.

We included randomised controlled trials that compared corticosteroids with standard of care or placebo and enrolled adults and/or children aged 5 and over in emergency departments and primary care settings with a clinical syndrome of sore throat (painful throat, odynophagia, or pharyngitis).

We excluded studies of participants who were admitted to hospital or immunocompromised and those with infectious mononucleosis, sore throat after any surgery or intubation (postoperative sore throat), gastroesophageal reflux disease, croup, or peritonsillar abscess. We also excluded studies that enrolled children aged under 5 because they would not be able to provide trustworthy outcome measurements, especially for self reported pain.

Our outcomes of interest were complete resolution of pain at 24 and 48 hours; mean time to onset of pain relief; mean time to complete resolution of pain; absolute reduction of pain at 24 hours; duration of bad/non-tolerable symptoms (such as problems for eating, drinking, swallowing); recurrence/relapse of symptoms; days missed from school or work; need for antibiotics; and rate of adverse events related to treatment. We included any adverse events reported by the authors.

**Data abstraction and risk of bias assessment**

Reviewers extracted the following data, independently and in duplicate: general study information (authors, publication year, and study location); study population details (sample size, age, diagnosis, and percentage of participants with confirmed group A β haemolytic streptococcus (GAS) pharyngitis or culture positive for bacterial pathogens); setting (primary care versus hospital emergency department); details on the intervention and comparison (for example, type, form, duration, and dose of corticosteroids; type of control group); co-interventions (proportion of participants who received antibiotics and/or analgesics); and outcomes as listed above.

In randomised controlled trials with more than two arms, we extracted data from the arm closest to a single dose regimen or data from the arm that received corticosteroid as adjunct treatment to standard of care rather than instead of standard of care. In trials with data for both oral and parenteral corticosteroids, we...
used oral data for the main analysis and intramuscular data for the appropriate subgroup analysis.

Two reviewers independently assessed risk of bias using the modified Cochrane risk of bias instrument, which deals with random sequence generation; allocation concealment; blinding of study participants, healthcare providers, and outcome assessors; incomplete outcome data; and other potential sources of bias. Reviewers classified studies at high risk of bias when they had rated at least one item as high risk of bias.

To assess the quality of evidence, we used the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) approach that classifies evidence as high, moderate, low, or very low quality based on considerations of risk of bias, consistency, directness, precision, and publication bias.20 We resolved disagreements between reviewers in data extraction and assessments of risk of bias or quality of evidence by discussion and, if needed, by third party adjudication. We used the MAGICapp platform to generate the GRADE summary of findings table.

**Data synthesis and statistical methods**

For continuous outcomes, we calculated the mean and its confidence interval. For dichotomous outcomes, we calculated the relative risk and its confidence interval. For dichotomous outcomes, we calculated the relative risk and its corresponding 95% confidence interval. For dichotomous outcomes, we calculated the mean difference and its corresponding 95% confidence interval.

**Results**

**Description of included studies**

We identified 2349 titles and abstracts through our literature search, of which 46 were potentially eligible and 36 were excluded (19 were not randomised trials; 14 had no patients with sore throat/acute pharyngitis; in three corticosteroids were not among the interventions or were not compared with a placebo/usual care). Figure 1 shows the details of study selection process.

The 10 randomised controlled trials that proved eligible enrolled 1426 individuals. Eight studies recruited patients from hospital emergency departments and two from primary care. Three studies enrolled children, six studies enrolled adults, and one study included both children and adults. Oral dexamethasone (single dose of 10 mg for adults and 0.6 mg/kg, maximum 10 mg for children) was the most common intervention (five studies) followed by single dose intramuscular injection of dexamethasone (three studies). All patients in three trials received both antibiotics and analgesics as the usual care; in two trials, all patients received antibiotics, while analgesics were prescribed at the physician’s discretion.

Table 1 presents study details.

**Patient involvement**

Five patient representatives were full members of the guideline panel, and contributed to the selection and prioritisation of outcomes, values and preferences assessments, and critical feedback to the protocol for the systematic review and the BMJ Rapid Recommendations manuscript.

Fig 1 | Selection of studies in review of corticosteroids for treatment of sore throat
Characteristics of studies included in systematic review of corticosteroids for treatment of sore throat

| Study               | Setting                  | Population          | Mean age (years) | Antibiotic use (%) | Analgesic use (%) | Pathogen positive* (%) | Type of steroid | Dose and duration | Dose and duration | No randomised controlled | Intervention Control | Intervention Control | Intervention Control | Control | Intervention Control | Control | Intervention Control | Control | Intervention Control | Control | Intervention Control | Control | Intervention Control |
|---------------------|--------------------------|---------------------|------------------|-------------------|-------------------|----------------------|----------------------|-------------------|-------------------|----------------------|---------------------|---------------------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|
| Hayward, 2017       | Primary care             | Adults              | 34.0             | 293/283           | 39.9              | 14.9                 | Dexamethasone (oral) | 10 mg, single dose | 39.9              | 39.0                 | 77.1                | 78.9                |
| Tasar, 2008         | ED                      | Adults              | 31.3             | 31/42             | NR                | NR                   | Dexamethasone (IM)  | 8 mg, single dose  | 100               | 100                  | 100                 | 100                 |
| Niland, 2006        | ED                      | Children            | 7.7†             | 30/30             | 100.0             | Dexamethasone (oral) | 0.6 mg/kg, max 10 mg, single dose | 47.1             | 63.0               | 37.1                | 41.2                |
| Olympia, 2005       | ED                      | Children            | 11.9             | 75/75             | 55.2              | Dexamethasone (oral) | 0.6 mg/kg, max 10 mg, single dose | 47.1             | 63.0               | 37.1                | 41.2                |
| Kiderman, 2005      | Primary care             | Adults              | 33.9             | 40/39             | 57.5              | Prednisone (oral)    | 0.6 mg/kg, max 10 mg, single dose | 51.4             | 63.2               | NR                   | NR                   |
| Bulloch, 2003       | ED                      | Children            | 9.7              | 92/92             | 46.2              | Dexamethasone (oral) | 0.6 mg/kg, max 10 mg, single dose | 48.9             | 43.5               | NR                   | NR                   |
| Wei, 2002           | ED                      | Adults              | 35.3             | 36/36             | 65.0              | Dexamethasone (oral) | 5 mg, single dose   | 100               | 100                | 100                 | 100                 |
| Marvez-Valls, 1998  | ED                      | Adults              | 28.1             | 42/42             | 39.0              | Dexamethasone (oral) | 0.6 mg/kg, max 10 mg, injection | 51.4             | 63.2               | NR                   | NR                   |
| O’Brien, 1993       | ED                      | Both                | 26.4             | 31/27             | 31.2              | Dexamethasone (oral) | 0.6 mg/kg, max 10 mg, single dose | 48.9             | 43.5               | NR                   | NR                   |

Among the included studies, four randomised controlled trials were at high risk of bias.\(^23\)\(^24\)\(^26\)\(^28\) One study had issues in more than one category of risk.\(^26\) The three remaining studies had issues in concealment of the treatment allocation, incomplete outcome reporting, and blinding of outcome assessors. Appendix 2 summarises the risk of bias assessments.

Table 2 shows findings for all outcomes. Interactive tables summarising findings are available at https://www.magicapp.org/goto/guideline/JjXYAL/section/j79pvn

Pain

In the five randomised controlled trials that reported complete resolution of symptoms at 24 hours,\(^16\)\(^25\)\(^29\)-\(^31\) patients who received a single dose of corticosteroids were twice as likely to experience complete symptom resolution than placebo patients (relative risk 2.24, 95% confidence interval 1.17 to 4.29; \(I^2=69\% ;\) 22.4% v 10.0%; moderate quality evidence; fig 2, table 2). All studies reporting this outcome were at low risk of bias. Tests of interaction showed no evidence of any subgroup effect (table A in appendix 3).

In the four trials that reported complete resolution of pain at 48 hours,\(^16\)\(^29\)-\(^31\) patients treated with corticosteroids were 50% more likely to experience complete resolution (relative risk 1.48, 95% confidence interval 1.26 to 1.75; \(I^2=3\% ;\) 60.8% v 42.5%; high quality; fig 3, table 2). These four studies were all at low risk of bias, and tests of interaction showed no evidence of any subgroup effect (table A in appendix 3).

In the eight studies that reported mean time to onset of pain relief,\(^16\)\(^23\)-\(^28\)\(^30\) patients who received corticosteroids experienced onset of pain relief on average 4.8 hours earlier than those who received placebo (95% confidence interval −1.9 to −7.8; \(I^2=78\% ;\) moderate quality; fig 4, table 2). We found no evidence of subgroup effect for this outcome (table A in appendix 3).
found no evidence of subgroup effect for this outcome (table B in appendix 3).

To assess the possibility that there was selective reporting, we examined the magnitude of effect on the time to onset of pain relief, time to complete resolution of pain, and absolute pain reduction in studies that did and did not report resolution of pain at 24 and 48 hours. The magnitude of effect on the other pain outcomes was similar in both sets of studies, making selective reporting less likely (table C in appendix 3).

Other outcomes
The authors of one study reported a possible decrease in the likelihood of receipt of antibiotics in patients treated with corticosteroids (relative risk 0.83, 95% confidence interval 0.61 to 1.13; moderate quality). Three studies suggested a possible lower risk of recurrence/relapse of the symptoms (0.52, 0.16 to 1.73; I²=23%; moderate quality, table D in appendix 3, table 2).

Kiderman and colleagues reported that 22/40 (55%) patients treated with corticosteroids and 27/39 (69%) taking placebo took time off work because of sore throat (relative risk 0.79, 95% confidence interval 0.56 to 1.13). Marvez-Valls and colleagues reported that adult patients treated with corticosteroids missed an average of 0.4 (SD 1.4) days, whereas patients in the placebo arm missed an average of 0.7 (SD 1.4) days.
Fig 2 | Relative risk for complete resolution of pain at 24 hours for corticosteroid v placebo groups in review of treatment of sore throat. Pooled relative risk calculated by DerSimonian-Laird random effects model

<table>
<thead>
<tr>
<th>Study</th>
<th>Events/total</th>
<th>Weight (%)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wei 2002</td>
<td>12/41</td>
<td>18</td>
<td>2.63 (0.93 to 7.45)</td>
</tr>
<tr>
<td>Kiderman 2005</td>
<td>17/40</td>
<td>18</td>
<td>4.14 (1.53 to 11.22)</td>
</tr>
<tr>
<td>Niland 2006</td>
<td>12/39</td>
<td>22</td>
<td>1.15 (0.54 to 2.46)</td>
</tr>
<tr>
<td>Tasar 2008</td>
<td>13/31</td>
<td>13</td>
<td>8.81 (2.14 to 36.23)</td>
</tr>
<tr>
<td>Hayward 2017</td>
<td>65/288</td>
<td>30</td>
<td>1.28 (0.92 to 1.78)</td>
</tr>
<tr>
<td>Overall (I²=69%, P=0.012)</td>
<td>119/439</td>
<td>100</td>
<td>2.24 (1.17 to 4.29)</td>
</tr>
</tbody>
</table>

Fig 3 | Relative risk for complete resolution of pain at 48 hours for corticosteroid v placebo groups in review of treatment of sore throat. Pooled relative risk calculated by DerSimonian-Laird random effects model

<table>
<thead>
<tr>
<th>Study</th>
<th>Events/total</th>
<th>Weight (%)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiderman 2005</td>
<td>23/40</td>
<td>10</td>
<td>1.73 (1.03 to 2.89)</td>
</tr>
<tr>
<td>Niland 2006</td>
<td>21/27</td>
<td>19</td>
<td>1.37 (0.95 to 1.99)</td>
</tr>
<tr>
<td>Tasar 2008</td>
<td>29/31</td>
<td>29</td>
<td>1.79 (1.32 to 2.42)</td>
</tr>
<tr>
<td>Hayward 2017</td>
<td>102/288</td>
<td>42</td>
<td>1.31 (1.02 to 1.68)</td>
</tr>
<tr>
<td>Overall (I²=3%, P=0.377)</td>
<td>175/386</td>
<td>100</td>
<td>1.48 (1.26 to 1.75)</td>
</tr>
</tbody>
</table>

difference −0.3 days, 95% confidence interval −0.87 to 0.27). None of the trials reported duration of bad/non-tolerable symptoms.

All studies except one sought information on adverse effects using different methods including standardised questionnaire (two studies), open ended questions or diaries to capture self reported adverse events (five studies), or a checklist of complications (two studies). Table 3 provides details of adverse effects assessed and methods used for capturing them. Six studies reported no adverse effects, and three studies reported adverse events, in both steroids and comparator arms, which were mostly complications related to disease and occurred with similar frequency in the intervention and control groups (table 3). Hayward and colleagues reported two serious adverse events (admission to hospital for pharyngeal or peritonsillar abscess, tonsillitis, and pneumonia) in the corticosteroids group (0.7%) and three in the placebo group (1.1%).

Olympia and colleagues reported one out of the 57 (1.8%) children in the corticosteroids group and two out of the 68 (2.9%) children in the placebo group developed a peritonsillar abscess (moderate quality, table 2 and table 3).

**Discussion**

In patients with acute sore throat, there is primarily moderate to high quality evidence that one or two low doses of corticosteroids reduces the intensity and duration of pain—pain scores at 24 hours, complete resolution of pain at 24 and at 48 hours, time to onset of pain relief, and time to complete pain relief. In this review, results were consistent across studies and across all pain outcomes (table 2). The reduction in pain achieved was modest—for example, mean time to complete resolution of pain was about 11 hours shorter, and about 18% more patients had complete pain relief at 48 hours. At 24 hours, the mean improvement in...
pooled mean difference of 2.33 hours (95% CI: -8.12 to 12.78), indicating a small but statistically significant difference in favor of corticosteroids. However, the heterogeneity was high (I² = 50%), suggesting that the findings may not be generalizable across all studies.

**Strengths and limitations of study**

Strengths of this review include explicit eligibility criteria; a comprehensive search developed with a research librarian; duplicate assessment of eligibility, risk of bias, and data abstraction; consideration of all outcomes important to patients; consideration of selective reporting bias; consideration of possible subgroup effects; and rigorous use of the GRADE approach to rate quality of evidence. The limitations of our review include a high degree of heterogeneity in some outcomes. We explored the source of heterogeneity by subgroup analysis and rated down for inconsistency in GRADE assessments for outcomes with unexplained heterogeneity.
In comparison with previous systematic reviews, we included two additional randomised controlled trials, which almost doubled the number of participants. Results from our meta-analysis are consistent with previous findings that corticosteroids reduce pain at 48 hours and probably reduce other pain outcomes. In addition to enhanced precision with the additional studies, our meta-analysis adds to the existing evidence in that we considered absolute in addition to relative effect measures, providing a clear picture of the magnitude of effect. In part because of input from the guideline panel, we considered additional outcomes that participating patients considered important, including risk of recurrence of symptoms, duration of bad/non-tolerable symptoms, need for antibiotics, and days missed from school or work.

Table 3 | Summary of adverse event assessments among trials included in systematic review of corticosteroids for treatment of sore throat

<table>
<thead>
<tr>
<th>Study</th>
<th>Methods used to assess adverse effects</th>
<th>Adverse effects assessed*</th>
<th>Adverse effects reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'Brien, 1993</td>
<td>Standardised questionnaire</td>
<td>Nausea, vomiting, or diarrhoea</td>
<td>None reported</td>
</tr>
<tr>
<td>Marvez-Valls, 1998</td>
<td>Self reported side effects at follow-up call</td>
<td>Any adverse event</td>
<td>None reported</td>
</tr>
<tr>
<td>Wei, 2002</td>
<td>Self reported side effects at follow-up call</td>
<td>Any adverse event</td>
<td>1 patient who received corticosteroids (3%) reported hiccups</td>
</tr>
<tr>
<td>Ahn, 2003</td>
<td>Not reported</td>
<td></td>
<td>None reported</td>
</tr>
<tr>
<td>Bulloch, 2003</td>
<td>Checklist of complication at follow-up call</td>
<td>Rash, joint pain, movement disorder, persistent fever, or blood in urine or “cola coloured” urine in past month, peritonsillar abscess</td>
<td>None reported</td>
</tr>
<tr>
<td>Kiderman, 2005</td>
<td>Not reported</td>
<td></td>
<td>None reported</td>
</tr>
<tr>
<td>Olympia, 2005</td>
<td>Checklist of complication at daily follow-up calls</td>
<td>Headache, nausea or vomiting, abdominal pain, myalgia, mood changes, dizziness, and swollen legs, peritonsillar abscess</td>
<td>1/57 (1.8%) children in corticosteroids group and 2/68 (2.9%) in control group developed peritonsillar abscess. 3/57 (5.3%) children in corticosteroid group and 2/68 (2.9%) in placebo group were admitted for dehydration</td>
</tr>
<tr>
<td>Niland, 2006</td>
<td>Patient completed diaries and by structured telephone interviews</td>
<td>Headache, abdominal pain (Wong-Baker FACES scale), fever, vomiting, and information sought regarding additional medical care</td>
<td>Steroid treatment did not result in additional patient adverse effects, symptom relapses, or complications related to disease</td>
</tr>
<tr>
<td>Tasar, 2008</td>
<td>Self reported side effects at follow-up call</td>
<td>Complications related to dexamethasone and azithromycin</td>
<td>None reported</td>
</tr>
<tr>
<td>Hayward, 2017</td>
<td>Attendance or telephone contact at any healthcare facility (including GP clinic, urgent care clinic, emergency department, or hospital admission) with symptoms or complications associated with sore throat (defined as direct suppurative complications or presentation with sore throat symptoms)</td>
<td>Any adverse event</td>
<td>2 serious adverse events (admissions for pharyngeal or peritonsillar abscess, tonsillitis, and pneumonia) in corticosteroids group (0.7%) and 3 in placebo group (1.1%)</td>
</tr>
</tbody>
</table>

*Reflect investigators’ attempts not only to detect adverse effect attributable to steroids, but also treatment failures, relapses, and complications related to disease.
work. An important additional contribution of the new evidence is that it extends the applicability beyond patients with severe sore throat treated with antibiotics for group A β haemolytic streptococcus pharyngitis in the emergency department, to a broader range of patients not treated with antibiotics.

We explored and were able to dismiss subgroup effects, with one exception: the reduction in mean time to complete resolution of pain was greater with intramuscular than with oral corticosteroids. The subgroup effect and its direction was specified a priori, the difference between subgroups was relatively large (about 21 hours), and chance seems an unlikely explanation (P<0.001). Credibility of the effect, however, is undermined as the effect modification is suggested by comparison between rather than within studies, and we found no similar difference in any other outcome. In addition, the only randomised controlled trial that compared oral and intramuscular treatment with dexamethasone reported no significant difference in any outcome.15

The few serious adverse effects in the included trials occurred with similar frequency in the intervention and control groups, although some minor adverse effects reported by patients might not always have been noted. Potential adverse effects that appear later are more likely to occur after repeated use or are rare would not have been captured in the trials. Recent observational studies have raised the possibility of extremely rare but serious adverse effects after short courses of corticosteroids. The quality of this evidence is, for several reasons, low with respect to the current question. The studies used observational designs from large databases with suboptimal verification of diagnoses; serious confounding by indication raises the possibility that the association is a result of the underlying disease process (such as acute inflammation or exacerbation) rather than the corticosteroids themselves; and indirectness in that the doses used in the trials were lower and the duration of treatment was considerably shorter than the duration in the observational studies. Among children, a recent overview of reviews looked at evidence from 44 randomised controlled trials on conditions that required a short course of steroids (such as asthma, bronchiolitis, croup, wheeze, and pharyngitis/tonsillitis) and reported no major adverse events.36

Despite previous evidence that corticosteroids might be beneficial, several groups and guidelines currently recommend against their routine use on the basis that evidence was applicable only to patients with severe pharyngitis who were also prescribed antibiotics in an emergency department.1378 The body of evidence now includes a broader representation of patients. The largest and most recent randomised controlled trial included 565 patients presenting to their general practitioner rather than an emergency department, and none of the patients initially received antibiotics.16

We found no subgroup differences with respect to patient group: the evidence seems to apply equally to patients who did and did not receive antibiotics. The evidence also seems to apply equally to patients with sore throat from group A β haemolytic streptococcus pharyngitis and some with sore throat negative for group A β haemolytic streptococcus.

In the five trials that reported co-interventions, about 80% of the participants received additional analgesics such as paracetamol and NSAIDs. Therefore, a single dose of corticosteroids seems to further reduce pain when used in combination with other analgesics. Although the benefits are relatively small, many patients are likely to consider them important. Patients with less severe sore throat, however, will obtain less absolute benefit from corticosteroids. Thus, the balance of benefits and harms almost certainly depends on the severity of the patient’s sore throat. With available evidence suggesting that serious adverse effects are rare or absent, the addition of one or two doses of steroids to the symptomatic management of sore throat is likely to appeal to many patients. More high quality data would be helpful to fully understand the net balance of benefits and harms according to severity of symptoms, particularly in primary care settings.

Linked articles in this BMJ Rapid Recommendations cluster

- summary of the results from the Rapid Recommendation process
- Magic App (www.magicapp.org) expanded version of the results with multilayered recommendations, evidence summaries, and decision aids for use on all devices

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Contributors: BS and RACS contributed equally to this work. TA, RACS, POV, and GHG conceived the study idea. BS, RACS, RB-P, TA coordinated the systematic review. BS, RACS, and TA wrote the first draft of the manuscript. BS and LL designed the search strategy. BS, RACS, LL, DP, and RB-P screened abstracts and full texts. BS, RACS, RB-P, and DP acquired the data and judged risk of bias in the studies. BS performed the data analysis and is guarantor. All authors interpreted the data analysis and critically revised the manuscript.

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Ethical approval: Not required.

Data sharing: All data are freely available within the appendices. No additional data available.

Transparency: The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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Appendix 1: Search terms and strategies

Appendix 2: Summary of risk of bias assessments among the included trials

Appendix 3: Supplementary tables and figure