Systemic Corticosteroids for Upper Respiratory Tract Infections in the Flyer

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INTRODUCTION: The use of systemic corticosteroids for upper respiratory tract infections has become increasingly common, but remains controversial. Given their purported ability to decrease duration of illness and hasten recovery, systemic corticosteroids offer an attractive treatment modality for flight surgeons desiring to minimize DNIF (Duty Not Including Flying) time. This commentary presents an evidence-based approach to the use of systemic corticosteroids for upper respiratory tract infections in flyers, concluding that the current body of evidence and missional concerns justify their routine use in sore throat and acute rhinosinusitis.

KEYWORDS: Upper respiratory tract infection, corticosteroid, sinusitis, pharyngitis, aviation.

Tanael M. *Systemic corticosteroids for upper respiratory tract infections in the flyer.* Aerosp Med Hum Perform. 2020; 91(5):453–454.

The use of systemic corticosteroids for upper respiratory tract infections has become increasingly common. One recent retrospective study found that systemic corticosteroids were prescribed in nearly 11% of outpatient visits for upper respiratory tract infections.[2] Given the reports of their benefit in upper respiratory tract infections, presumably by decreasing inflammation, systemic corticosteroids are of great interest to the flight surgeon who desires to minimize DNIF (Duty Not Including Flying) time.

A growing body of evidence suggests benefit of systemic corticosteroids in sore throat. For example, a 2012 Cochrane Review consisting of eight trials found that, when added to antibiotics, systemic corticosteroids decreased the mean time to symptom relief and time to complete symptom resolution.[6] Moreover, given that only 44% of these patients had confirmed GABHS (Group A beta-hemolytic streptococci) one can reasonably conclude that systemic corticosteroids have benefit in both viral and bacterial pharyngitis. A systematic review and meta-analysis published in the *British Medical Journal* (BMJ) in 2017 supports this conclusion, finding that a single dose of corticosteroids provides decreased mean time to both symptom relief and resolution in viral and bacterial pharyngitis.[10] In addition, the largest randomized controlled trial to date, comprised of 565 patients, demonstrated that those receiving a single dose of systemic steroids experienced greater rates of complete resolution of their viral pharyngitis compared to those in the placebo group at 48 h.[5] In light of this evidence the BMJ Rapid Recommendations Team encourages the routine use of systemic corticosteroids in most patients with acute sore throat.[1] Given this recommendation and the above evidence, the regular use of a single dose of 10 mg of prednisone (the most common dosing used in the studies mentioned above) in flyers with pharyngitis appears a safe and efficacious means to minimize symptoms and DNIF time.

While a more substantial body of evidence exists for their use in sore throat, the benefit of systemic corticosteroids appears to extend to acute rhinosinusitis as well. In a 2014 Cochrane Review of five placebo-controlled trials examining systemic steroids in acute rhinosinusitis, the authors found that steroids given in conjunction with antibiotics hastened relief and resolution compared to placebo or NSAIDS given in conjunction with antibiotics.[11] While the one trial included in the Cochrane Review that compared systemic corticosteroids to placebo as monotherapy in rhinosinusitis found no benefit for corticosteroids, an examination of the inclusion criteria of the other trials included in the Cochrane Review that used corticosteroids in conjunction with antibiotics reveals that many of the patients who received antibiotics likely did not meet criteria for acute bacterial rhinosinusitis per current American College of

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This manuscript was received for review in November 2019. It was accepted for publication in January 2020.

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DOI: https://doi.org/10.3357/AMHP.5548.2020

Physicians (ACP) guidelines and American Academy of Otolaryngology—Head and Neck Surgery (AAOHNS) guidelines, suggesting that systemic corticosteroids do have benefit as monotherapy.[4,9] Indeed, the current AAOHNS guidelines published in 2015 consider systemic corticosteroids for both viral and bacterial acute rhinosinusitis an acceptable practice, albeit one with less evidence than other therapies.[9]

For acute rhinosinusitis, the ideal dosing regimen is less clear than in pharyngitis. One trial demonstrated benefit of corticosteroids after 3 d, but used very high doses of 0.8–1.2 $mg \cdot kg^{-1}$ of prednisone.[7] Other trials showed benefit of lower doses of corticosteroids for slightly longer duration, with one showing oral betamethasone 1.0 mg daily for 5 d as efficacious and another showing oral methylprednisolone 8 mg (equivalent to oral prednisone 10 mg) TID for 5 d as effective.[3,8] Given this heterogeneity, flight surgeons can reasonably give 3–5 d of corticosteroids, allowing the individual patient's presentation and concerns to guide exact dosing and duration. When selecting which corticosteroid to use in acute rhinosinusitis, the largest study included in the Cochrane Review showed prednisone to have an excellent safety profile, making it a sensible choice in fliers with acute rhinosinusitis.[11]

While even detractors of systemic corticosteroids for upper respiratory tract infections admit they likely have some benefit, they characterize the benefit as relatively modest, and, thus, argue they do not justify the risk of adverse events. While benefit does tend to be on the order of hours—an 11-hour decrease in duration of illness according to one meta-analysis mentioned above—in flyers, relatively small amounts of time carry import; time on DNIF compromises their mission and creates a burden on others.[10] Consequently, any decrease in the duration of illness and time to improvement is highly desirable.

When weighing the cost and benefit of systemic corticosteroids for upper respiratory tract infections it ought to be noted that the systematic reviews and meta-analyses above showed no increased risk of serious adverse effects compared to placebo, with gastrointestinal upset frequently cited as the most common side effect. Admittedly, a recent retrospective study that received significant media attention did find increased risk of sepsis, fracture, and thromboembolism within the first 90 d of receiving short term corticosteroids (defined as less than 30 d).[12] However, these patients tended to have several comorbidities and the average duration of treatment was 6 d—longer than the durations shown to have benefit in sore throat or rhinosinusitis.

As aviators tend be younger, healthy patients with few comorbidities, that a single dose of systemic steroids appears effective in sore throat, and as little as 3 d of systemic steroids appears effective in rhinosinusitis, flyers likely have much lower risk for these adverse outcomes than the patients in the study. Moreover, the study received significant criticism of its methodologic design as patients who received steroids tended to have more comorbidities than controls, and the authors did not take into account relative severity of diseases when matching patients with controls. Instead of sepsis, thromboembolism, and fracture, the most concerning side effects of systemic corticosteroids for aviators are likely neuropsychiatric: insomnia, anxiety, and psychosis—all of which can be minimized by having flyers ground-trial the medication and go through a mandatory 6-h DNIF (analogous to that used in zolpidem which has a half-life of 2–3 h, nearly identical to that of prednisone) after ingestion of the medication to ensure minimal risk of adverse reactions. Once asymptomatic and outside the window of the mandatory DNIF, flyers can safely perform all duties required of them.

With their potential to shorten DNIF time, systemic corticosteroids provide an attractive option for flight surgeons when treating patients with upper respiratory tract infections. While their benefit may seem modest to civilian physicians, missional concerns weight the scales in favor of their routine use in flyers who, given their relatively few comorbidities, have low risk of adverse effects, especially when duration of the medication is minimized and ground-testing completed.

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