Zinc:

Primary:

1. Belongia EA, Berg R, Liu K. A randomized trial of zinc nasal spray for the treatment of upper respiratory illness in adults. Am J Med 2001;111:103-8.

Extended Abstract:

Study objectives: to evaluate the efficacy of 0.12% zinc sulfate nasal spray for reducing duration and severity of acute upper respiratory infections. In addition to duration and severity of general cold symptoms, data was also reported for throat symptoms including soreness, itchiness and hoarseness.

Methods:

Design: randomized controlled trial

Allocation: participants were equally randomized into either the treatment or placebo groups. Both groups followed administration instructions of two inhalations into each nostril four times daily until symptoms resolved or 14 days maximum. Prior to allocation, participants must have met inclusion criteria which included: two or more symptoms for < 24 hr cough, stuffy nose, runny nose, hoarseness, sore/itchy throat, headache, sneezing, or muscle ache. Exclusion criteria included pregnancy, smoked tobacco during the past 12 months, immunodeficiency, diagnosed sinus infection < 30 days, chronic lung disease, zinc allergy, diagnosed allergic rhinitis < 12 months, any cold symptom > 24 hr, on any antibiotics, positive culture or group A streptococcus.

Blinding: double blinded. Treatment and placebo were indistinguishable and identified by a number. The study personnel did not know which patients were receiving which treatment.

Follow-up period: The total duration of the study was two weeks.

Participants: 185 employees at Marshfield Clinic in Wisconsin, USA joined the study in May 1999.

Intervention: treatment was 0.12% zinc sulfate solution. Placebo was same isotonic solution without zinc. Both solutions also contained other non-medicinal ingredients including benzalkonium chloride, benzyl alcohol, sodium chloride and water. The spray pump delivered a volume of 0.1 mL and 0.011 mg of elemental zinc.

Outcomes: Symptoms were recorded by each participant in a diary twice daily. Eight symptoms were rated based on severity from none, mild, moderate, severe: cough, stuffy nose, runny nose, hoarseness, sore/itchy throat, headache, sneezing and muscle aches. There was also documentation for each dose, oral temperature twice daily, use of over the counter products, and adverse effects.

Patient follow-up: Patients were called on days two and six to address side effects, compliance issues and questions. An exit interview was conducted if the patient's symptoms resolved for at least 24 hr or a total of two weeks maximum.

Setting: in community, workplace and at home.

Main results: There was no significant difference in median time to symptom resolution between the groups which was seven days (P=0.45). There was also no significant difference in median time to resolution of throat symptoms (hoarseness, sore and itchy throat) which as three days in the zinc group and four days in the placebo group (P=0.16). There was a statistically significant reduction in total symptom score for zinc only on day 1 after baseline differences were corrected for (P=0.02).

Improvement in total symptoms from zinc was largely due to nasal symptoms over sore throat symptoms. There was no significant difference in adverse events between the two groups therefore zinc nasal spray is safe.
Conclusions: The use of zinc sulfate 0.12% nasal spray two sprays in each nostril four times daily did not provide any significant reduction in cold duration or symptoms over placebo. The zinc product may have helped improve nasal symptoms in the first day of cold symptoms however there was not measured benefit in treating throat symptoms. However the product did not present any increased harm to the patient.
Comments/critical appraisal (including assessment of internal and external validity): A major limitation of this study was that despite randomization, there was a significant difference in baseline symptoms between each group which when corrected for reduced the magnitude of the treatment affect from zinc. A larger study population including more patients from the community over a larger age range may have helped improve the ability to detect a treatment effect. Another reason for not detecting a treatment effect may be due to using a dose of zinc which was too low. The study was internally valid since it was a high quality randomized controlled trial which accounted for compliance, reasons for patient dropout and concomitant medication use. The study is externally valid only for patients who meet the inclusion/exclusion criteria (healthy, early onset, not pregnant or taking antibiotics etc.) so not all patients may use zinc nasal spray. Also there may be a lack of zinc nasal spray products available in Canada approved as a natural health product with Health Canada.

2. Hirt M, Nobel S, Barron E. Zinc nasal gel for the treatment of common cold symptoms: a double-blind, placebo-controlled trial. Ear Nose Throat J. 2000 Oct;79(10):778-80, 782.

Study objectives: to study the efficacy of a new approach for treating the common cold using a zinc nasal gel formulation. The study was created to reproduce an earlier unpublished study using nasal gel which showed improvement of cold symptoms.
Methods:
Design: randomized controlled trial, adapted study design from Mossad *et. al.* 1996 with zinc lozenges.
Allocation: patients were randomly randomized to receive zinc or placebo if they had cold symptoms < 24hr. Subject must have completed informed consent with at least three symptoms including cough, headache, hoarseness, muscle ache, nasal drainage, nasal congestion, scratchy throat, sore throat, or sneezing. Exclusion criteria included pregnancy, immunocomprimised, >24hr symptom duration and use of certain medications such as other cold remedies.
Blinding: double blinded
Follow-up period: five months
Setting: four sites in Los Angeles, CA
Participants: 213 patients with recent onset (<24 hr) cold symptoms
Intervention: treatment was zinc gluconate (dose 33 mmol/L) in emulsion with benzalkonium chloride, glycerin, hydroxyethylcellulose, sodium chloride and sodium hydroxide at pH 7.2. The placebo product was the same formulation without zinc. 120 μL of gel was administered in each nostril every 4 hours (9am, 1pm, 5pm, 9pm) as long as there were symptoms present.
Outcomes: the primary endpoint was complete resolution of symptoms with a symptom score of zero. Patients recorded symptoms in a diary twice a day grading nine symptoms listed above on a scale of absent to severe (0-3).

Patient follow-up: patients completed a followup interview if symptoms resolved within 24 hours.
Main results: duration of cold symptoms was significantly lower in the zinc group (2.3 days) over placebo (9 days) (P<0.05). The only side effect noted by participants was a slight tingling or burning sensation (42% in treatment group compared to 37% in placebo group). No specific breakout of results was provided for sore throats however this symptom was included in the overall assessment of efficacy.
Conclusions: zinc nasal gel is effective in shortening the duration of the common cold if treated in < 24hr of symptom onset.
Comments/critical appraisal (including assessment of internal and external validity): The quality of this study is severity compromised by not reporting baseline symptoms and population demographics making it difficult to directly associate the treatment to effect observed. The effect size seems exaggerated compared to the efficacy of other zinc studies which showed little to no benefit. No information was provided assessing patient compliance to therapy, dropouts, or conflicts of interest. Stating that the study design was similar to another published study does not provide sufficient detail of any modification which may have been made to the study design. All cold symptoms were combined into one effect and no results were broken down into effect size on sore throat. There may not be any zinc nasal gel product approved by Health Canada with a NHP number making it difficult to recommend a product to patients. For these reasons the internal validity of this study is poor and limits the external validity of using zinc nasal gel in patients.

3. Kurugol Z, Akilli M, Bayram N, Koturoglu G. The prophylactic and therapeutic effectiveness of zinc sulphate on common cold in children. Acta Paediatrica 2006;95:1175–81.

Study objectives: to study the efficacy of both prophylaxis and treatment of the common cold symptoms duration and severity in children using zinc sulfate syrup.
Methods:
Design: randomized controlled trial.
Allocation: children were randomized using a computer code into treatment or placebo group. Children must have been between the ages of 2-10 years old with no chronic diseases, asthma, immunodeficiency, prior reaction to zinc, use of other specified medications or nonconsent of patents. A cold was defined as having at least two out of ten symptoms including cough, nasal drainage, nasal congestion, headache, hoarseness, muscle ache, itchy throat, sneezing, sore throat and fever (T>37°C).
Blinding: double blinded since all study personnel and children did not know the treatment they were receiving.
Follow-up period: Oct 2004 until May 2005.
Setting: Ege university nursery and primary school, at nursery and at home.
Participants: 200 healthy children between the ages of two to ten years old.
Intervention: intervention was oral zinc sulfate 15 mg once daily for seven months versus syrup placebo. If a cold developed, the dose was increased to zinc two times daily for a total dose of 30 mg at the onset of symptoms and until the symptoms resolved or 10 days maximum. The treatment formulation contained 1.32 g zinc in 100 cm^3 or 15 mg zinc in a 5cm^3 spoonful. The placebo contained all other ingredients minus zinc. Other ingredients included glycerin, glucose, sunset yellow, orange essence, and nipajin preservative.
Outcomes: The primary outcome was number of colds per study per child while the secondary outcome was duration and severity of cold symptoms scored 0-3 mild to severe. Sore throat symptom contained the summed scores for sore throat, itchy throat and hoarseness. At school a pediatrician recorded symptoms and severity while at home parents performed this task and all data was followed up by a pediatrician.

Patient follow-up: All children were followed by a pediatrician for cold symptoms and adverse events.
Main results: The mean number of colds in the zinc group (1.2±1.4 colds per child) was significantly less than the placebo group (1.7±1.2 colds per child) *(P*=0.003). Using prophylactic zinc reduced the number of colds per year from 2 to 1 per child (*P*<0.001). Children in the treatment group also missed less school compared to placebo (0.9 days vs. 1.3 days, *P*=0.04). The zinc group also had a shorter mean duration (4.7d vs. 5.3d) of cold symptoms and total severity of symptoms (*P*<0.0001). The effect of sore throats was significant since the duration was reduced from 1.8 to 2.4 days (*P*=0.01). Adverse effects were similar in both groups.
Conclusions: prophylactic use of zinc sulfate syrup significantly reduced the occurrence and severity of the common cold in children. There was also a significant reduction specifically on sore throat occurrence and severity.
Comments/critical appraisal (including assessment of internal and external validity): this study was high quality since it met many of the internal validity criteria including randomized controlled trial, double blinded, strict inclusion/exclusion criteria, similar baseline symptoms/population demographics, products underwent laboratory standardization, all participants were accounted for, and it was supervised by a pediatrician. The treatment effect was significant and provided more evidence for the use of zinc in children and for prevention as well as treatment of the common cold. The study was rigorous, is internally valid and therefore may be applied externally. However it may be difficult to find a zinc over the counter product available in Canada in syrup form.

4. Mossad SB, Macknin ML, Medendorp SV, Mason P. Zinc gluconate lozenges for treating the common cold. A randomized, double-blind, placebo-controlled study. Ann Intern Med 1996; 125: 81–88.

Study objectives: to test the efficacy of zinc gluconate lozenges in reducing the duration of symptoms caused by the common cold.
Methods:
Design: randomized controlled trial.
Allocation: patients were randomized to receive treatment or placebo based on developing symptoms of the common cold within 24 hours.
Blinding: double blinded.
Follow-up period: one week.
Setting: outpatient department of a large tertiary care centre.
Participants: 100 employees of the Cleveland Clinic who developed symptoms of the common cold within 24 hours before enrollment.
Intervention: patients in the zinc group received lozenges (one lozenge every two hours while awake) containing 13.3 mg of zinc from zinc gluconate as long as they had cold symptoms. Patients in the placebo group received similarly administered lozenges that contained 5% calcium lactate pentahydrate instead of zinc gluconate.
Outcomes: subjective daily symptom scores for cough, headache, hoarseness, muscle ache, nasal drainage, nasal congestion, scratchy throat, sore throat, sneezing, and fever (assessed by oral temperature).
Patient follow-up: all cold symptoms and severity were recorded by participants daily.
Main results: the time to complete resolution of symptoms was significantly shorter in the zinc group than in the placebo group (median, 4.4 days compared with 7.6 days; $P < 0.001$). The zinc group had significantly fewer days with coughing (median, 2.0 days compared with 4.5 days; $P = 0.04$), headache (2.0 days and 3.0 days; $P = 0.02$), hoarseness (2.0 days and 3.0 days; $P = 0.02$), nasal congestion (4.0 days and 6.0).

Conclusions: The use of zinc gluconate lozenges showed a significant reduction in cold symptoms and severity. The use of zinc lozenges also showed some benefits for treating throat symptoms in adults.
Comments/critical appraisal (including assessment of internal and external validity): Based on the abstract this article presents a high quality randomized controlled blinded trial with a standardized treatment and assessment of symptoms. More information is needed to assess an equal randomizations, baseline equality, inclusion/exclusion criteria, follow-up and monitoring of participants. Therefore no assessment of internal/external validity may be provided at this time without full access to the article.

5. Prasad AS, Beck FWJ, Bao B, Snell D, Fitzgerald JT. Duration and severity of symptoms and levels of plasma interleukin-1 receptor antagonist, soluble tumor necrosis factor receptor, and adhesion molecules in patients with common cold treated with zinc acetate. Journal of Infectious Diseases 2008;197(15):795–802.

Study objectives: to provide more evidence to support the use of zinc lozenges for treating the common cold, to relate zinc to both clinical and laboratory markers to understand effect on inflammation and cellular adhesion mechanisms.
Methods:
Design: randomized placebo controlled trial
Allocation: randomized to receive treatment or placebo within 24 hours of common cold symptom onset.
Blinding: double blinded, all products were assigned a randomization code with identical packaging.
Follow-up period: January 1999 to 2003
Setting: Detroit Medical Centre and Wayne State University, Michigan, USA.
Participants: 50 ambulatory volunteers > 18 years old consisting of medical students, house staff, and employees from Wayne State University.
Intervention: treatment was a lozenge containing zinc acetate 13.3 mg vs. placebo every 2-3 hours while awake. The lozenges were composed of a sucrose and corn syrup base with cherry-oil flavoring. The placebo contained sucrose octaacetate instead of zinc.
Outcomes: primary endpoint was average duration of cold symptoms and secondary endpoint was plasma levels of four plasma chemical markers (interleukin-1, tumor necrosis factor, vascular endothelial cell adhesion molecule, and intercellular adhesion molecule). Participants recorded cold symptoms daily and rated them based on severity from 0-3 none to severe. Patients must have had at least 2 out of 10 symptoms for less than 24 hours: cough, headache, hoarseness, muscle ache, nasal drainage, nasal congestion, scratchy throat, sore throat, sneezing, and fever. The study also assessed the quality of the blinding and found that participants were unable to detect if they were receiving treatment or placebo.
Patient follow-up: participants returned to clinic on day five for a blood sample and one day after their cold symptoms resolved for confirmation. All lozenges were counted to measure compliance.
Main results: the zinc intervention had a shorter mean overall duration of cold (4 vs. 7.1 days, $P<0.001$). A breakdown was provided for all ten symptoms where the duration of sore throat was 1.96 days with treatment versus 3.24 days with placebo ($P=0.07$).
Conclusions: zinc acetate lozenges were significantly effective in decreasing the mean duration of cold symptoms. There was a trend towards a reduction in sore throat symptoms however the treatment size was not large enough to be considered significant.
Comments/critical appraisal (including assessment of internal and external validity): The study had a high internal validity since it was a rigorous randomized controlled trial. The treatment and placebo groups were similar at baseline, products were standardized, and assessment of symptoms, side effects

and compliance was conducted by a medical clinic. The blinding of the lozenges was verified by testing to see if each participant knew what treatment they were receiving. Therefore the study is externally valid and can be applied to the general population.

Systematic Review/Meta:

6. Singh M, Das RR. Zinc for the common cold. Cochrane Database of Systematic Reviews 2011, Issue 2.

Study objectives: to assess the effect of zinc on common cold symptoms and establish its role in therapy by analyzing the many papers published showing mixed results.
Scope - describe the scope of included studies (ex. patients, interventions, outcomes, duration, etc.): A total of 15 trials were included for analysis. Looking specifically at the sore throat trials, four trials were included for time to sore throat resolution (Kurugol 2006a; Macknin 1998; Prasad 2000; Prasad 2008) and two trials showing a change in sore throat symptom severity (Douglas 1987;Petrus 1998). Kurugol 2006a included children ages two to ten years old who received zinc syrup with 15 mg zinc in a five cm^3 spoonful twice daily for ten days. Macknin 1998 included children aged six to 16 years old who received zinc lozenges 10 mg five to six times daily until symptoms resolved. Prasad 2000 included adults who took one zinc lozenge 12.8 mg every two to three hours when awake as long as they experienced cold symptoms. Prasad 2008 included adults who took one zinc lozenge 13.3 mg every two to three hours while awake until cold symptoms resolved. Douglas 1987 included healthy adults who took six to eight zinc lozenges 10 mg a day at two hour intervals for a minimum of three days and a maximum of six days. Petrus 1998 included participants 18 to 54 years old who took a zinc lozenge 9 mg every 1.5 hours while awake on day zero, then one zinc lozenge every two hours while awake while symptoms were present for up to 14 days.
Methods – describe how studies were identified, number and type of trials included, and any other relevant information regarding the methods: articles were gathered by searching CENTRAL, MEDLINE and EMBASE primary literature databases from 1966 to 2010. Only trials which were double-blinded randomized controlled trials using zinc for at least five days to treat or at least five months to prevent the common cold were included in the meta-analysis. Two independent review authors extracted the data and assessed trial quality.
Main results: zinc was associated with a significant reduction in duration (P=0.001) and severity of cold symptoms (P=0.04). Other statistically significant benefits included reduced symptoms at day seven, incidence rate ratio of getting a cold, school absenteeism, and prescription antibiotics. However taking zinc had more side effects which was only significant for bad taste and nausea. Looking at the four studies assessing duration of sore throat symptoms, the time to resolution of symptoms was significantly reduced with a reduction in standard mean difference of -0.24 (P=0.02). For the two trials looking at reduction in sore throat severity, the effect was insignificant.
Conclusions: zinc was efficacious for reducing the incidence, duration and severity of cold symptoms with only a minor increase in side effects. There are a large number of zinc products on the market therefore in order to ensure highest efficacy and safety, only use zinc formulations in the way they were studied by high quality clinical trials.
Comments/critical appraisal (including assessment of internal and external validity): the Cochrane Collaboration is recognized for its expertise in the area of creating scientific meta-analysis geared towards clinical decision making for health care professionals. The standardized approach of inclusion criteria, exclusion criteria, defined methods and statistical analysis contain a high degree of internal

validity. The conclusions made are externally valid and may be applied to a wide range of patients based on population data. However it is always a good idea to take a look at the specific interventions used and patient population included in each study used before applying a recommendation to a patient.

Clinical Practice Guideline:

7. ESCMID Sore Throat Guideline Group, Pelucchi C, Grigoryan L, Galeone C, Esposito S, Huovinen P, Little P, Verheij T. Guideline for the management of acute sore throat. Clin Microbiol Infect. 2012 Apr;18 Suppl 1:1-28.

Study objectives: to publish an evidence-based clinical practice guideline to be used by health care professionals on the diagnosis and treatment of acute sore throat.
Scope - describe the scope of included studies (ex. patients, interventions, outcomes, duration, etc.): studies included falled under categories including bacterial pathogens, clinical assessment, laboratory tests, and treatment referencing a total of 386 articles. The treatment trials for sore throat generated recommendations for analgesics, corticosteroids, zinc, herbals, acupuncture, and antibiotics. Looking specifically at zinc, only three papers were considered: Mossad 1996, Macknin 1998, and Singh 2011. Mossad 1996 included adults with acute cold symptoms treated with zinc gluconate lozenges 13.3 mg one lozenge every two hours while awake until symptoms resolved. Macknin 1998 included children aged six to 16 years old who received zinc lozenges 10 mg five to six times daily until symptoms resolved. Singh 2011 was a Cochrane review meta-analysis which assessed a variety of trials and made the conclusion that zinc helped reduce sore throat duration but not necessarily severity of symptoms.
Methods – describe how studies were identified, how recommendations were graded, and any other relevant information regarding the methods: articles were considered for the diagnosis and treatment of uncomplicated acute sore throat with symptoms lasting less than 14 days. Studies were excluded if they were unpublished, contained persistent sore throat, recurrence, complicated pharyngitis, severe comorbidities, immunosuppression, history of rheumatic fever, sore throat associated with travelling outside of Europe, sexually transmitted infections or rare epidemics. Articles were searched using Medline, PubMed and Cochrane reviews using keywords from other sore throat guidelines between the years 2002-2009. More than 1000 articles were reviewed and critically appraised using a rating system.
Main results: Based on the three trials, the guideline stated that zinc gluconate is not recommended for sore throat since the trials generated conflicting results and showed an increase in adverse events. The Cochrane review did conclude that taking zinc within 24 hours of symptom onset did reduce the duration and severity of cold symptoms. It is difficult to mare a firm zinc recommendation due to the high variability in doses, formulations and duration of treatments used.
Conclusions: zinc gluconate is not recommended for treating acute sore throat.
Comments/critical appraisal (including assessment of internal and external validity): The internal validity of this study is compromised by a grant from Pfizer who also organized and attended the expert meeting. The guideline lacks an evidence based recommendation on zinc by only looking at three trials. Therefore the guideline lacks external validity and should not be used as a clinical bottom line for patients.

Tertiary/Secondary:

8. Stead W. Patient information: Sore throat in adults (Beyond the Basics). UpToDate. 2013.

Source description – describe type of resource, referencing, peer review, date of last update, and any other relevant information regarding the source: UpToDate® is a trusted evidence-based clinical support tool for clinicians. The articles are written by doctors, editors and peer reviewers with zero funding from private companies or drug manufacturers. The article relating to the common cold is called the common cold in adults: treatment and prevention written by Dr.Daniel Sexton and Dr. Micah McClain, edited by Dr. Martin Hirsch, Dr. Mark Aronson and Dr. Fenny Lin, last updated on November 29, 2012.
Summary – describe the author's recommendations for the therapeutic agent: the author recommends not using zinc preparations due to uncertain benefits and known toxicities including irreversible anosmia for some preparations. The author did agree that zinc sulfate lozenges and syrup may decrease cold symptom severity and duration. Ten studies were referenced to support the author's claim (Eby 2004, Eby 1984, Marshall 2000, Caruso 2007, Singh 2011, Jackson 1997, Hemilä 2011, Science 2012, FDA 2011, Davidson 2010, and Douglas 2007).
Comments/critical appraisal (including assessment of internal and external validity): the author's claim to avoid using zinc preparations was based on many papers showing benefit, no benefit and harm. Therefore the claim to avoid zinc is valid however it may be overly conservative considering that there is a demonstrated benefit of using zinc. There is also a lack of critical appraisal and explain why certain articles were included or rejected for investigation. Therefore the external validity is compromised since the statement to use or not to use zinc needs to consider other factors such as the form of zinc, dose, formulation, duration of treatment and patient population under investigation.

9. Lynch TP. Respiratory Disorders: Viral Rhinitis. E-Therapeutics, Canadian Pharmacists Association, Ottawa, ON, 2013.

Source description – describe type of resource, referencing, peer review, date of last update, and any other relevant information regarding the source: e-Therapeutics is a Canadian resource for prescribing and managing drug therapy. It provides health care professionals with evidence-based information on diagnosis and treatment of disease. Articles are written by specialists in their area, peer reviewed and updated with current primary literature evidence. This article was last updated in September 2012. The author used four articles to support this claim (Garland 1998, Jackson 2000, Turner 2000, Singh 2011).
Summary – describe the author's recommendations for the therapeutic agent: zinc gluconate mar reduce the symptoms and duration of the common cold however the evidence is not conclusive. A review found that taking zinc within 24 hours of symptom onset for at least five days reduced cold symptom severity and duration. Using zinc for prevention of the common cold was found to reduce the incidence. Recommending a specific product may be challenging in some cases based on the studies. There was no significant increase in adverse effects while taking zinc other than a slight increase in unpleasant taste and nausea.
Comments/critical appraisal (including assessment of internal and external validity): The claim made by e-Therapeutics is consistent with what is published in the scientific literature surrounding the use of zinc for the common cold. The claims made are internally valid since the studies investigated were high quality, included meta-analysis, randomized controlled trials and a balance of positive and negative claims for using zinc. Therefore the external validity is high and may be used to treat patients experiencing cold symptoms.

10. Roy Hélène. Viral Rhinitis, Influenza, Sinusitis and Pharyngitis, Patient Self Care, Second Edition, Canadian Pharmacists Association, Ottawa, ON, 2010. pg 193-6.

Source description – describe type of resource, referencing, peer review, date of last update, and any other relevant information regarding the source: Patient Self Care provides a patient focused framework to treating diseases with up to date evidence. The articles are written by expert authors and reviewers presented in an accurate and unbiased format. The second edition was last published in 2010. The nine articles used to support the recommendations are Potter 1993, Marshall 1998, Mossad 1996, Garland 1998, Macknin 1998, Turner 2000, Caruso 2007, Jackson 1997 and Marshal 2000.

Summary – describe the author's recommendations for the therapeutic agent: if zinc is used, the lozenge should contain at least 13.3 mg of elemental zinc free from any binding agents which may chelate zinc and reduce absorption such as citrate and tartaric acid. Treatment should start within 48 hours of symptom onset. Dose as one lozenge every two hours while awake. Side effects which may lead to discontinuation of therapy include bad taste, mouth irritation, nausea and diarrhea. Avoid in cases of aphthous ulcers or gastric erosions as zinc may exacerbate it. Monitor for drug interactions since zinc may decrease the absorption of tetracycline or quinolone antibiotics. Avoid the use of zinc nasal spray due to potential long term or permanent loss of smell.

Comments/critical appraisal (including assessment of internal and external validity): The claim made by patient self care is accurate, clear and evidence based on primary literature. The claims are supported by nine articles of high quality increasing the internal validity of the claims. The external validity is high since the recommendation is patient focused and clearly states the recommended dose, frequency, route, and contraindications.