EMERGENCY MEDICINE GRAND ROUNDS
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The Common Cold, Influenza and Sinusitis: Evidence-Based Treatment of Acute Rhinosinusitis

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Fever is nature's engine which she brings to the battlefield to vanquish her enemies.

—English physician Thomas Syndenham (1624 – 1689)

Recommendations

1. Antiviral antibiotic zinc *(ZiCam Rapidmelts)* will shorten your cold by 1-2 days.
2. Combination cold medications, Motrin, Aleve, aspirin and acetaminophen (*Tylenol*) will make you feel better but get sicker.
3. Don't treat fever < 104°F (40°C); do use an electric blanket for muscle aches and to kill viruses and bacteria. Use a zap-in-the-microwave heat pack on the sinuses.
4. Use honey, naproxen and 12-hour dextromethorphan for bad cough.
5. Use oxymetazoline (*Afrin*) nasal spray up to 10 days, for those > 2 years old.
6. Use salt water saline nasal spray frequently. For infants, use a blue bulb syringe to suck out the nose afterwards.
7. If cold worse at 5-6 days, or lasts > 10 days for adults (14 days for kids) still with cough, nasal discharge, fever, or sinus pain, use a steroid nasal spray and consult a doctor for an antibacterial antibiotic.

It happens to us all. The common cold. It's not an emergency, but people want an instant cure.

Causes

Colds are "caused" by rhinovirus (>100 types of picornavirus), coronavirus, adenovirus, coxsackievirus, echovirus, orthomyxovirus, paramyxovirus (parainfluenza), enterovirus, metapneumovirus, influenza (flu), Covid-19 and respiratory syncytial virus (RSV), which is severe in kids but mild in adults and may cause asthma. Still, we don't know the cause of ¼-½ of colds. Some infected with a virus don't notice it but can spread it.[1] Colds with bacterial overgrowth (~20%, usually *S. pneumoniae, H. influenzae*, or *M. catarrhalis*) are worse; but antibiotics don't help.[2] Whooping cough *(Bordetella pertussis)* is like a cold, with bouts of cough so bad you may vomit, and often with red eyes; treat with azithromycin if you suspect it as pertussis tests take a long time.

Winter is cold and flu season, maybe from crowding or cold noses. Being out in the cold briefly doesn't cause colds,[3] but cold feet will cause a cold, likely from viruses replicating better in cold, so get an electric blanket.[4] Sleep deprivation makes you twice as likely to get a cold.[5] Flu vaccines make you 50% less likely to get the flu or a cold that is really mild flu. Flu shots protect against heart attack, stroke and likely Alzheimer's[6,7] and are safe and effective when pregnant, protecting the unborn baby.[8]

Stress and allergic rhinitis make colds more likely, though exercise, except strenuous military PT, makes you *less* likely to get a bad cold.[9] Neither diet nor big tonsils make colds more likely.[10] ICAM-1, a cell membrane receptor that rhinovirus uses to infect cells, increases with dust, pollen and tobacco smoke, predisposing to colds.[11] Those with low vitamin D deficiency are more likely to get colds,[12] and Vitamin D can prevent colds (but not the flu)[13] Those who taste bitter better are less likely to get colds.[14] If you feel lonely your cold will be worse.[15]

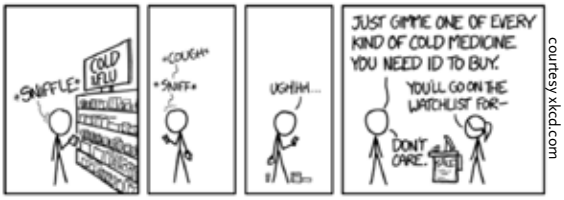
Epidemiology and Economics (US figures)

- 1 billion colds/yr
- Kids: every 6 weeks; once/month if in school/daycare11
- Adults: 2-4/yr, decreases with age
- 27% of kid's ED visits in 2010 for colds
- 22 million school days/yr lost
- >$20 billion/year work loss (>1/3 caring for sick kids)
- We spend $4 billion a year on OTC cold medications
- We spend $400 million/year on ℞ "cold" medications

Natural History/Symptoms

Onset is ~10 hours; symptoms peak in 2-3 days, and last 2-14 days, smokers 3 days longer.[16] A cold is contagious from a day *before* symptoms to 5 days (flu: 5-7 days) after.

Symptoms depend more on *you* than the specific virus. It usually starts with a ***sore throat*** (usually normal on exam) – helpful to distinguish a cold from allergy – as well as ***coryza***: red, swollen nasal mucosa (not pale and boggy like allergy) and clear nasal drainage. Later, there is ***catarrh***: purulent yellow-green nasal discharge. Colored drainage does ***not*** mean bacterial infection.[17] With a *winter* cold, adults get chills and a *low* body temperature, but kids < 12 usually get a fever. Adults with a *summer* cold may get fever for 2-3 days.[18] Poor appetite, malaise, and headache are common; half get muscle aches (myalgias) but not as bad as with the flu. This is from immune-system ***cytokines***, which is why non-steroidal anti-inflammatory drugs (NSAIDs: ibuprofen = *Motrin*, *Advil*, *Nuprin* and naproxen = *Aleve),* and acetaminophen *(Tylenol),* which inhibit cytokines, make you feel better temporarily but make you sicker, sick longer, and more likely to give the cold/flu to others.[19,20] British statisticians estimate that people taking cold/flu medicines with NSAIDs or acetaminophen kills ~700 people each US flu/cold season.[21] Some argue that acetaminophen and NSAIDs make feverish kids better able to eat, but Zofran (ondansetron) nausea medicine is likely safer. Cough is universal, and the major cause of medical visits.[10,17] If winter and there's fever (in adults) and bad myalgias (muscle aches), especially if vomiting or diarrhea, then it's likely the flu. Rapid flu tests miss 1/3-2/3 of flu; see flu score on next page.[22-27]



courtesy xkcd.com

Complications

Almost a quarter of kids with a cold get an ear infection. Pneumonia is common after a cold, often mixed viral and bacterial, especially in kids. Asthma usually gets worse with a cold. Flu (which often just seems like a cold) makes you 2-5x more likely to have a myocardial infarction or stroke;[28] taking ibuprofen triples that risk; the IV NSAID ketorolac increases it 7x.[29] Covid (which also often just seems like a cold) increases your MI/stroke risk 6x;[30] taking NSAIDs increases it even more.[31]

Cough

Colds are the #1 cause of cough.[32] Most OTC (over-the-counter) and ℞ (prescription) medicines – like guaifenesin (*Robitussin*, *Mucinex)* and diphenhydramine *(Benadryl)* are useless; codeine is useless, has bad side effects, kills infants, *and* is addictive.[33-40] Benzonatate *(Tessalon)* does little for cough, and if you take too much, you may seize or die.[41-44] Dextromethorphan (DM) is the best of the over-the-counter *and* prescription cough medicines, but doesn't help much; 12-hour syrups are best. Honey is as good as DM so use both; avoid in kids <1.[45] Avoid pollen-less honey smuggled in from China. NSAIDs like ibuprofen and naproxen (*Aleve)* help cough.[46,47] One study shows ibuprofen is safe in pregnancy except maybe 6 weeks before delivery, and is safe with breastfeeding,[48-51] but another study shows that NSAIDs make miscarriage more likely.[52] Naproxen is otherwise better: ibuprofen is 4x/day, naproxen just 2x/day. Ibuprofen is associated with male infertility,[53] and at higher doses, makes myocardial infarction or stroke more likely, especially if you have a cold or the flu, [7,29] which naproxen doesn't. An albuterol inhaler and spacer will help cough if wheezing or a family history of asthma.[54] A cough lasts 17.8 days, so 2-3 weeks of lingering cough is normal.[55]

Rhinorrhea/Nasal Congestion

First generation antihistamines like diphenhydramine *(Benadryl),* help runny nose the first 2-3 days but makes you sleepy; second-generation ones *(Claritin, Zyrtec, Allegra)* are useless for this.[49,50] Antihistamines later clog up the sinuses.

Pseudoephedrine (e.g., *Sudafed)* helps a bit, but has bad side effects.[56] OTC phenylephrine has bad side effects *and* is useless.[57] Oxymetazoline nasal spray (e.g., *Afrin*) helps, and makes you less contagious.[58] Don't use for >10 days (not 3 days as on the bottle) or you'll have to use it the rest of your life to breathe through your nose (rhinitis medicamentosa).[56,59]

Ipratropium *(Atrovent)* nasal spray (℞ only, $56 for generic) helps a bit.[59] Steroid sprays (e.g., *Flonase*, *Nasonex*) don't help colds,[60] but help sinusitis.[61-63] Saline (salt water) spray helps colds[64] and sinusitis.[65,66] Don't use a neti pot with unboiled tap water unless you want an amebic brain abscess. Sealed, pressur-

Flu Score	
2	fever plus cough
2	muscle aches
1	< 48 hours
1	chills or sweats
Total	**% chance flu**
0-2	8%
3	30%
4-6	59%

ized saline is best.

Myalgia/Malaise/Fever

Many "colds" are mild influenza: don't take aspirin which can cause Reye's Syndrome (liver failure). Both aspirin and acetaminophen (e.g., *Tylenol*) make your nose more stuffy, and make you sick longer.[67] Tylenol worsens asthma,[68] and ibuprofen (*Motrin*, *Advil*, *Nuprin*) likely does too.[69] NSAIDS decrease malaise, myalgias and cough.[70] But, fever fights infections;[21,71,72] suppressing fever makes you sicker and spreads infection. Treating the fever of the flu kills 700 people a year in the US.[21] Treat only if >104°F=40°C. An electric blanket is probably better than medicine!

Combination Cold Medications

Combination medications (e.g., *Theraflu*, *NyQuil*, *DayQuil*) include two or more of: acetaminophen (*Tylenol;* see above); an antihistamine; a decongestant; or a cough suppressant. Useless for those < 12, they also kill those under 2 who get the wrong dose.[73] Manufacturers can afford expensive lobbyists; thus, they can market useless medications to children 2-12. Canada does not allow marketing to kids under 6.[74] 2/3 of US homes have combination cold meds;[75] even in adults, there's no real evidence they help. Given bad side effects, avoid them.[34]

Zinc, "Alternative" Therapies and Homeopathy

ZiCam zinc nasal spray was sold as "homeopathic" (to get around FDA regulations) but it contained large concentrations of zinc. The FDA made them stop selling it after hundreds permanently lost their sense of smell.[76] *ZiCam Nasal Spray* is now just expensive *Afrin*. Zinc oral **spray** and **lozenges** (e.g. *ZiCam*), however, are safe and effective: if you start within 24 hours, will make you feel 10-20% better and shorten your cold (or maybe flu) by 1-2 days. You need ~90 mg a day to work; each ZiCam has 10 mg. It's an antiviral antibiotic.[77]

To make a homeopathic remedy, put a tiny bit of an ingredient that cause the symptoms you want to cure, sometimes a poison. Dilute this over and over while hitting the bottle with a leather paddle (has to be leather). This magically changes the water, even though there may not be a single molecule of the original ingredient left. *Properly*-prepared homeopathic remedies are harmless, though they may keep you from getting something better;[78] but one homeopathic teething gel killed 10 babies.

Hot baths are long recommended,[79] and fever kills viruses,[71] as may warmth on the sinuses. Breathing warm, humidified air for 20 minutes helps in the UK (where there is little central heat: colder noses?) and Israel, but not in the US.[80,81]

Echinacea,[82] Vitamin C[83] and garlic[84] are useless for treatment. Vitamin C *prevents* colds at the risk of kidney stones.[83,85] Chicken soup improves nasal mucus drainage,[86] and decreases inflammation.[87] Elderberry might help influenza, but might be worse than nothing.[88] Some prescribe steroids such as prednisone but even short courses double or triple the risk of a blood clot in the leg, long-bone fracture, or overwhelming bacterial sepsis.[89]

Influenza

Flu treatment is the same as for a cold, but also the prescription nausea medication ondansetron (*Zofran*) and the OTC diarrhea medication loperamide (*Imodium-AD*) may help. A large, high-quality study in 2019, recommends oseltamivir for anyone with flu symptoms (cold symptoms plus fever and cough and muscle aches) regardless of flu test results: *Adding oseltamivir* [Tamiflu] *to usual primary care for patients with influenza-like illness accelerates recovery by a mean of about one day, and slightly longer in individuals with risk factors, irrespective of influenza status. Initiating oseltamivir 48–72 h after illness onset appears to give similar benefit to earlier initiation. Clinicians might consider treatment in patients who are sicker or older, who have comorbidities, and who have been unwell for longer, because oseltamivir might reduce their illness by as much as 2–3 days.*[90] In 2017, H3N2 influenza killed 80,000 people in the US, and it's contagious from a day before symptoms until 5-7 days later. **Don't kill people**: stay home for 7 days. After the flu, you feel tired for a month *(post-influenza asthenia);* there is no treatment.

Colds vs. "Sinusitis"

Three days of nasal congestion, and now your snot is yellow, green or purple? An antibacterial antibiotic will *not* help. Really. Despite this 53% think they need an antibacterial antibiotic for a cold,[91,92] and thousands of doctors give them.[92] Call a cold *acute viral rhinosinusitis:* yes, your sinuses are infected – but with a virus and you need the *antiviral* antibiotic zinc. Some colds have bacterial superinfection,[93] but antibacterial antibiotic benefit is outweighed by side effects, especially diarrhea.

Sinus opacification shows on CT scans of ~90% with a cold and ~40% ***without*** a cold, so is useless for diagnosing "sinusitis," as are X-rays.[18,93-95] The diagnosis is based on history. Precise criteria are controversial.[63,96,97] The real question is: when will an antibacterial antibiotic help more than harm? (a) onset with *very severe* symptoms or *high fever* for at least 3-4 days, or (b) worsening after 5-6 days or (c) with ongoing nasal discharge (or daytime cough in kids) > 10 days in adults or >14 days in kids.[98-100] Steroid nasal spray helps, even in kids, but oral steroids are not recommended.[18,100,101] Amoxicillin, Bactrim and Zithromax no longer work due to resistant pneumococcus; top choices are Augmentin, high-dose if high fever, daycare, age <2 or >65, recent hospitalization, antibiotics in the past month, or immunocompromised (high-dose is 2 g BID for adults, 90 mg/kg/day for kids), doxycycline, or Levaquin/Avelox[97,100] but now with bad side effects of quinolones like Levaquin/Avelox,[102,103] cefdinir is now second-line for kids and Ceftin is third-line for adults, both safe with penicillin allergy.[104] Those with bad nasal allergies also get bacterial sinusitis.

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