not address blepharitis specifically, but the U.S. Navy Aeromedical Reference and Waiver Guide does discuss allergic conjunctivitis and the concern that symptoms of itching, burning, eyelid edema, and blurred vision can interfere with flight.[6,10,13] Since these symptoms are also often present in blepharitis, it is appropriate to temporarily ground the aviator during initial treatment until symptoms that could interfere with flight have resolved. Also, the Air Force Waiver Guide discusses dry eye syndrome, which is often associated with blepharitis. It states that mild symptoms do not require wavier action; however, moderate symptoms controlled with medications will require a waiver. If moderate symptoms are uncontrollable or if symptoms are severe, the condition is generally considered disqualifying.[11]

In this case, the patient did not have pain or any change in vision and only mild itching. As such, he was left in flying status during treatment without complication. Symptoms significantly improved after 48 h of treatment with antibiotic ointment, eyelid cleanses with baby shampoo, warm compresses, and artificial tears.

**Kitz R. *You're the flight surgeon: blepharitis.* Aerosp Med Hum Perform. 2018; 89(1):72–74.**

## ACKNOWLEDGMENTS

The author would like to thank LCDR Gavin C. McEwan, M.D., Director of Ophthalmology, Naval Hospital Pensacola, FL, for his guidance and review of this article. The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the U.S. Navy, the Department of Defense, or the U.S. Government.

## REFERENCES

1. Bernardes TF, Bonfioli AA. Blepharitis. Semin Ophthalmol. 2010; 25(3):79–83.
2. Bezza Benkaouha I, Le Brun C, Pisella PJ, Chandenier J, Lanotte P. [Bacterial flora in blepharitis]. J Fr Ophtalmol. 2015; 38(8):723–728 (In French).
3. Cornea/External Disease Preferred Practice Pattern® Panel. Preferred Practice Pattern®. Blepharitis. San Francisco (CA): American Academy of Ophthalmology; 2013. [Accessed 20 Apr. 2017]. Available from https://www.aao.org/preferred-practice-pattern/blepharitis-ppp–2013.
4. Dadaci Z, Kılınç F, Ozer TT, Sahin GO, Acir NO, Borazan M. Periodic acid–Schiff staining demonstrates fungi in chronic anterior blepharitis. Eye (Lond). 2015; 29(12):1522–1527.
5. Ehlers JP, Shah CP. The Wills eye manual: office and emergency room diagnosis and treatment of eye disease, 5th ed. Philadelphia (PA): Wolters Kluwer/Lippincott Williams & Wilkins; 2008:102–108, 113–118.
6. Federal Aviation Administration. Guide for aviation medical examiners. Washington (DC): Federal Aviation Administration; 2017. [Accessed 20 Apr. 2017]. Available from https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/media/guide.pdf.
7. Geerling G, Tauber J, Baudouin C, Goto E, Matsumoto Y, et al. The international workshop on meibomian gland dysfunction: report of the subcommittee on management and treatment of meibomian gland dysfunction. Invest Ophthalmol Vis Sci. 2011; 52(4):2050–2064.
8. Hossain P, Konstantopoulos A. Blepharitis: remains a diagnostic enigma. A role for tea tree oil shampoo? Eye (Lond). 2015; 29(12):1520–1521.
9. Jackson WB. Blepharitis: current strategies for diagnosis and management. Can J Ophthalmol. 2008; 43(2):170–179.
10. Naval Aerospace Medical Institute. 12.17. Allergic conjunctivitis. In: U.S. Navy aeromedical reference and waiver guide. Pensacola (FL): Naval Aerospace Medical Institute; 2016. [Accessed 13 Apr. 2017]. Available from http://www.med.navy.mil/sites/nmotc/nami/arwg/Pages/AeromedicalReferenceandWaiverGuide.aspx.
11. Newbold PR, Van Syoc D. Dry eye syndrome (keratoconjunctivitis sicca) (Feb. 2017). In: Air Force waiver guide. Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2017:293–299. [Accessed 20 Apr. 2017]. Available from http://www.wpafb.af.mil/afrl/711hpw/USAFSAM/.
12. Pflugfelder SC, Karpecki PM, Perez VL. Treatment of blepharitis: recent clinical trials. Ocul Surf. 2014; 12(4):273–284.
13. U.S. Army Aeromedical Activity. Flight surgeon's aeromedical checklists. Ft. Rucker (AL): U.S. Army Aeromedical Activity; 2014. [Accesssed 20 Apr. 2017]. Available from http://glwach.amedd.army.mil/victoryclinic/documents/Army_APLs_28may2014.pdf.

---

This article was prepared by Charles G. Mahakian, M.D., M.P.H.

You are the flight surgeon at the home of the C-17 and C-5. It is Tuesday afternoon and you are the only flight surgeon in the clinic. Your colleagues are currently deployed around the globe, and the Chief of Aerospace Medicine is in a 3-h-long executive committee meeting. The afternoon clinic is winding down, signaling the end of another day. As you sit at your desk, finishing the last of your charting, you hear a knock at your door. One of your medical technicians informs you that there is a walk-in aircrew member who has come in and would like to be seen. Informing the technician to check the patient into a room, you grab your stethoscope and head to the exam room to log onto the computer system. Once the log-in process is complete, you open up the Department of Defense's electronic medical record system, the Armed Forces Health Longitudinal Technology Application. Turning, you greet the patient, a 27-yr-old Caucasian male C-17 loadmaster. He reports that he moved to the area 3 mo ago and has a nagging cough that won't go away. He says that everyone in the family (wife, 4-yr-old daughter, and twin 6-mo-old boys) had a "cold" a few weeks ago, which has resolved, but he has continued to have a cough for the last 2 wk. He denies a fever, chills, or shortness of breath or that the cough is worse in the morning or when lying down. He coughs 2-3 times per hour and reports it does not affect his ability to do his job. On physical exam his blood pressure is 114/72, pulse is 72, respiratory rate is 14, he is afebrile, and oxygen saturation is 98% on room air. Nasal mucosa is clear and

DOI: https://doi.org/10.3357/AMHP.4993.2018

moist, oropharynx is pink without evidence of discharge, and his lungs are clear bilaterally.

**1. What is your diagnosis?**

A. Upper respiratory tract infection.
B. Chronic cough.
C. Post viral cough.
D. Asthma.
E. Seasonal allergic rhinitis.

## ANSWER/DISCUSSION

**1. C.** Besides the cough, the loadmaster does not have any symptoms associated with an upper respiratory tract infection.[2] He has had the cough for less than 8 wk, which does not meet the definition of a chronic cough.[6] He does not have any difficulty breathing, which is in the diagnostic criteria for asthma,[10] nor does he have the boggy nasal mucosa that would suggest post nasal drip, a symptom of seasonal allergic rhinitis, as the cause.[5] A cough following viral upper respiratory tract infection can persist for 8 wk following infection.[14] Treatment is symptomatic, with the cough resolving in time. Although it is a mild cough, most of the medications used to treat it, such as Tessalon Perles, Robitussin, and dextromethorphan, are not approved for flight duties.* After discussing this with the patient, he decides to forgo medication and see if the cough will resolve on its own. Since it does not interfere with his ability to perform his duties, you keep him on flying status and instructing him to follow up if needed.

Two weeks later his name shows up on your schedule in an acute appointment slot. Walking into the room, you see the loadmaster coughing into his hand. He reports that the cough has gotten worse, occurring several times per hour and keeping him awake at night. It is still nonproductive, but it is coming in fits now, sometimes leaving him feeling lightheaded afterwards. He again denies any fever or chills. His vital signs today are blood pressure 118/78, pulse 80, respiratory rate 16, afebrile, and oxygen saturation 96% on room air. Nasal mucosa is still clear and moist, oropharynx is pink, and examination of the lungs now reveals faint crackles in the right lung base. He starts coughing with deep inspiration that does not change the crackles.

**2. What is your next step?**

A. Prescribe an antibiotic (i.e., Zithromax) for 5 d and reevaluate.
B. Prescribe an albuterol metered dose inhaler as needed.
C. Perform a chest radiograph (X-ray).
D. Prescribe oral codeine as a cough suppressant as needed.
E. Continue reassurance and observation.

## ANSWER/DISCUSSION

**2. C.** Although his symptoms are similar to those of acute bronchitis, the physical signs seen on physical examination are not. Inspiratory crackles are a rare finding in acute bronchitis and more suggestive of pneumonia.[21] A resting oxygen saturation of less than 95% indicates hypoxemia, which is also atypical in acute bronchitis.[21] Both of these indicate the need for further evaluation, and the first step is a chest radiograph. Because the etiology of his cough is not clearly known at this time, it is too early to initiate antibiotic therapy, and prescribing an albuterol inhaler or oral codeine would treat the symptoms but not the underlying cause.

You send the patient for a chest X-ray, which he has done in the clinic and returns to your waiting area. A short time later you receive a call from the on-call radiologist, who reports seeing nodular and ground glass opacities in both upper lobes. The radiologist recommends performing a high-resolution computed tomography scan of the chest, which you order. The patient has the scan done the following day, and you receive a faxed copy of the report, which shows centrilobular ground glass opacities, with scattered 1- to 2-mm nodules in the upper lobes, suggestive of nonspecific interstitial pneumonitis. You refer the patient to pulmonary medicine, where pulmonary function testing reveals a carbon dioxide diffusion capacity of 50% and moderate restrictive lung disease. The patient undergoes a bronchoscopy with bronchoalveolar lavage and transbroncheal biopsies that confirm the diagnosis of hypersensitivity pneumonitis (HP).

HP is a complex disease caused by an amplified immune response in susceptible individuals to one or more of numerous organic and chemical antigens.[18] It was first described in 1932, associated with moldy hay exposure, and since that time more than 50 different occupational and environmental antigens have been identified.[15] HP has been known by many other names, including farmer's lung, ventilation pneumonitis, woodworker's lung, hot tub lung, tobacco grower's lung, humidifier's lung, pigeon breeder's disease, and chemical worker's lung.[18] The prevalence in exposed populations is variable, with farmer's lung prevalence ranging from 1–19% in exposed farmers, while pigeon breeder's lung has a prevalence of 6–20% in those exposed.[13] HP may occur in both adults and children,[13] although the rates in children have been reported as rare (4 per 1,000,000).[18]

There are three versions of HP described in the literature: acute HP, subacute HP, and chronic HP.[18] Acute HP is characterized by an influenza-like syndrome of fever, chills, malaise, myalgia, and/or headache, with dry cough, dyspnea, tachypnea, and chest tightness.[13] It has a sudden onset, usually within 4 to 12 h after exposure to the causative antigen.[13] Subacute HP has an insidious onset, with fatigue, cough, and dyspnea developing over the course of a few weeks to a few months.[18] Subacute HP usually has progressive symptoms, with worsening cough and dyspnea.[18] Both acute and subacute HP can progress to chronic HP, although some cases of chronic HP have not reported any acute episodes.[18] Symptoms of chronic HP include progressive dyspnea, malaise, fatigue, and weight loss.[18] Pulmonary fibrosis, which is often progressive, is found in chronic HP, and patients typically have permanent loss of lung function.[18]

The diagnosis of HP is difficult, as it lacks unique features from other interstitial lung diseases.[18] Diagnosis requires exposure to a known antigen and confirmatory findings, with several different diagnostic criteria proposed.[8] The diagnosis can be confirmed by four of the following six criteria: symptoms compatible with HP, exposure to a causative antigen determined by history or detecting antibodies by serum testing (serum precipitins) and/or by bronchoalveolar lavage, radiographic findings of HP, lymphocytosis of bronchoalveolar lavage

* U.S. Air Force. Official Air Force aerospace medicine approved medications. 2017 Jan. 1. [Accessed 1 Mar. 2017]. Available from https://kx2.afms.mil/kj/kx4/FlightMedicine/Documents/Standards/Med%20List%20Jan%202017%20(final).pdf to those with access.

fluid, tissue histology that is compatible with HP, and reproducing symptoms when exposed to the environment.[17] Pulmonary function testing in patients typically shows restriction with gas exchange impairment.[13] HP should be in the differential diagnosis of all patients with respiratory symptoms and restrictive lung disease.[16] Assessment of the work and home environment is usually a critical factor leading to the diagnosis.[7]

The main factor to treating HP is avoidance of the causative antigen.[13] It has been shown that returning to the environment, even while on high-dose systemic corticosteroids, can result in return of symptoms.[7] Pharmacological therapy is primarily systemic corticosteroids,[18] but the efficacy of long-term use has not been verified in prospective clinical trials.[13,18] They are recommended for those with functional impairment and pulmonary function abnormalities.[13] Currently it is recommended to start with 0.5 $mg \cdot kg^{-1} \cdot d^{-1}$ of prednisone for 6 wk, then slowly taper down to 10 $mg \cdot d^{-1}$ as a maintenance dose.[18] It has been shown that 3 mo of therapy usually results in disease remission.[18] For those who do not show a functional or clinical response to corticosteroids, other immunosuppressive agents, such as rituximab, a monoclonal antibody, have been shown to be effective.[9] The prognosis is variable, depending upon the antigen exposure.[13] Overall acute HP has a favorable prognosis, while the presence of fibrosis indicates a poor outcome.[13]

### 3. Which of the following has specific guidance concerning HP?

A. U.S. Air Force.
B. U.S. Navy.
C. U.S. Army.
D. Federal Aviation Administration (FAA).
E. None of the above.

## ANSWER/DISCUSSION

**3. E**. Due to the rarity of the condition, HP is not specifically listed in any of the services' waiver guides or regulations or the FAA's guidance, but can be classified as a miscellaneous respiratory condition for each.

In the U.S. Air Force, the use of systemic corticosteroids for any inflammatory condition is not waiverable.† Extrapolating from the waiver criteria for anaphylaxis, if the service member has a known causative antigen, treated with avoidance with or without steroids, then a waiver to return to flying status could be considered.[4]

A Navy service member with lung disease that interferes with performance of duties is disqualified from service.[1] Recurrent use of systemic glucocorticoid steroids is not approved for U.S. Navy aircrew personnel.[11] Those sailors requiring systemic corticosteroids for control are not qualified for flight duties, with no waiver recommendation.[12]

Abnormal findings on examination of the lungs or radiographs does not meet the standard for continued service in the U.S. Army.[19] Extrapolating from the waiver guidelines for allergic rhinitis, if the condition required systemic corticosteroids then a waiver is required for continued flying duties.[20]

In civilian aviation, an FAA decision is required for special issuance for a pilot with a history of HP.[3]

The loadmaster began treatment with prednisone 60 mg daily. Further questioning revealed that the home he and his family had moved into had a hot tub, and the area was not well maintained. He and his wife had discussed it with the landlord, but it had not been professionally serviced in "a while," and the only cleaning that had been done was by the loadmaster. Bioenvironmental engineers from the base were sent to the home to inspect it and noted mold growing around the base of the hot tub, as well as in the plumbing behind the control panel. Cultures performed at that time confirmed the mold as *Mycobacterium avium-intracellulare*.

The loadmaster was treated with prednisone for 6 wk, then slowly tapered off the medication over the next 2 mo, and his signs and symptoms resolved. Six months after starting prednisone, his follow-up pulmonary function testing showed normal lung function, and the abnormalities seen on his computed tomography scan have resolved. His landlord has had the hot tub area professionally cleaned, with no further evidence of mold present. The loadmaster no longer goes out to the hot tub, and he reports being ready to return to flight status. Because he had an identified, avoidable antigen, and does not have any residual deficits, he is granted a waiver and returns to flying status.

**Mahakian CG. *You're the flight surgeon: hypersensitivity pneumonitis.* Aerosp Med Hum Perform. 2018; 89(1):74–77.**

## ACKNOWLEDGMENTS

The author would like to thank Lt. Col. Dara Regn, M.D., Chief, Aeromedical Consultation Service, Internal Medicine Branch, U.S. Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH, for being a mentor and instructor and for reviewing this article and providing valuable guidance and unwavering assistance during the writing process. The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Air Force, the Department of Defense, or the U.S. Government.

## REFERENCES

1. Department of the Navy. Bureau of Medicine and Surgery. Article 15-42(19): Lungs, chest wall, pleura, and mediastinum. In: Manual of the Medical Department. Washington (DC): Department of the Navy; 2005. NAVMED P-117. [Accessed 8 Mar. 2017]. Available from http://www.med.navy.mil/directives/Pages/NAVMEDP-MANMED.aspx.
2. Eccles R. Understanding the symptoms of the common cold and influenza. Lancet Infect Dis. 2005; 5(11):718–725.
3. Federal Aviation Administration. Pleura and pleural cavity. In: Guide for aviation medical examiners. Washington (DC): Federal Aviation Administration; 2017:69. [Accessed 8 Mar. 2017]. Available from https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/.
4. Frayser MR, Van Syoc D. Urticaria, angioedema, and anaphylaxis (Feb 17). In: Air Force waiver guide. Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2017:1024–1031. ([Accessed 1 Jun. 2017]. Available from http://www.wpafb.af.mil/afrl/711hpw/USAFSAM/.
5. Howarth PH. Allergic and nonallergic rhinitis. In: Adkinson NF, Jr., Yunginger JW, Busse WW, Bochner BS, Holgate ST, Simons FE, editors. Middleton's allergy: principles and practice. 6th ed. Philadelphia (PA): Mosby; 2003:1391.

† U.S. Air Force. Official Air Force aerospace medicine approved medications. 2017:20. [Accessed 1 Mar. 2017]. Available from https://kx2.afms.mil/kj/kx4/FlightMedicine/Documents/Standards/Med%20List%20Jan%202017%20(final).pdf to those with access.

6. Irwin RS, Baumann MH, Bolser DC, Boulet LP, Braman SS, et al. Diagnosis and management of cough executive summary: ACCP evidence-based clinical practice guidelines. Chest. 2006; 129(1, Suppl)1S–23S.
7. Jacobs RL, Thorner RE, Holcomb JR, Schwietz LA, Jacobs FO. Hypersensitivity pneumonitis caused by Cladosporium in an enclosed hot-tub area. Ann Intern Med. 1986; 105(2):204–206.
8. Lacasse Y, Selman M, Costabel U, Dalphin JC, Ando M, et al. Clinical diagnosis of hypersensitivity pneumonitis. Am J Respir Crit Care Med. 2003; 168(8):952–958.
9. Lota HK, Keir GJ, Hansell DM, Nicholson AG, Maher TM, et al. Novel use of rituximab in hypersensitivity pneumonitis refractory to conventional treatment. Thorax. 2013; 68(8):780–781.
10. National Institutes of Health, National Heart, Lung, and Blood Institute. Expert panel report III: guidelines for the diagnosis and management of asthma. Bethesda (MD): National Institutes of Health, National Heart, Lung, and Blood Institute; 2007.
11. Naval Aerospace Medical Institute. 5.2 Gout. In: U.S. Navy aeromedical reference and waiver guide. Pensacola (FL): Naval Aerospace Medical Institute; 2016. [Accessed 8 Mar. 2017]. Available from http://www.med.navy.mil/sites/nmotc/nami/arwg/Pages/AeromedicalReferenceandWaiverGuide.aspx.
12. Naval Aerospace Medical Institute. 15.1 Asthma. In: U.S. Navy aeromedical reference and waiver guide. Pensacola (FL): Naval Aerospace Medical Institute; 2016. [Accessed 8 Mar. 2017]. Available from http://www.med.navy.mil/sites/nmotc/nami/arwg/Pages/AeromedicalReferenceandWaiverGuide.aspx.
13. Ohshimo S, Bonella F, Guzman J, Costabel U. Hypersensitivity pneumonitis. Immunol Allergy Clin North Am. 2012; 32(4):537–556.
14. Poe RH, Harder RV, Israel RH, Kallay MC. Chronic persistent cough. Experience in diagnosis and outcome using an anatomic diagnostic protocol. Chest. 1989; 95(4):723–728.
15. Rose C, King TE, Jr. Controversies in hypersensitivity pneumonitis. Am Rev Respir Dis. 1992; 145(1):1–2.
16. Salvaggio JE. The identification of hypersensitivity pneumonitis. Hosp Pract. 1995; 30(5):57–62.
17. Schuyler M, Cormier Y. The diagnosis of hypersensitivity pneumonitis. Chest. 1997; 111(3):534–536.
18. Selman M, Pardo A, King TE, Jr. Hypersensitivity pneumonitis: insights in diagnosis and pathobiology. Am J Respir Crit Care Med. 2012; 186(4):314–324.
19. U.S. Army. 2-23. Lungs, chest wall, pleura, and mediastinum. In: Standards of medical fitness. Washington (DC): Department of the Army; 2016:12. Army Regulation 40-501. [Accessed 8 Mar. 2017]. Available from https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/AR40-501_WEB_Final.pdf.
20. U.S. Army Aeromedical Activity. Allergic/nonallergic rhinitis (ICD9 477/477.9). In: Flight surgeon's aeromedical checklists. Ft. Rucker (AL): U.S. Army Aeromedical Activity; 2014. [Accessed 8 Mar. 2017]. Available from http://glwach.amedd.army.mil/victoryclinic/documents/Army_APLs_28may2014.pdf.
21. Wenzel RP, Fowler AA, 3rd. Clinical practice. Acute bronchitis. N Engl J Med. 2006; 355(20):2125–2130.