



## Zara M. Patel

Associate Professor of Otolaryngology/Head and Neck Surgery (Rhinology) and, by courtesy, of Neurosurgery at the Stanford University Medical Center

Otolaryngology - Head & Neck Surgery Divisions

### CLINICAL OFFICES

- **Stanford Dept of Otolaryngology, Head and Neck Surgery**

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### Bio

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#### BIO

Dr. Zara M. Patel is Director of Endoscopic Skull Base Surgery and an Associate Professor of Otolaryngology and, by courtesy, of Neurosurgery at Stanford. She was born and raised in St. Louis, completed her MD at the Oregon Health and Sciences University in Portland, Oregon and completed her residency training in otolaryngology at Mount Sinai Medical Center in New York, NY. After pursuing fellowship training in rhinology and endoscopic skull base surgery at Stanford University, she was recruited to join the Emory University faculty in Atlanta in 2011. After four years, the rhinology division recruited her back to the West coast to rejoin the department here at Stanford University.

Dr. Patel is an expert in advanced endoscopic sinus and skull base surgery. She treats patients with a wide variety of rhinologic complaints, including chronic sinus infection or inflammation, sinus disease that has failed medical therapy, sinus disease that has failed prior surgical therapy, cerebrospinal fluid leaks, benign and malignant sinus and skull base tumors, as well as olfactory disorders.

She is immediate past-Chair of the Education Committee and now Member of the Board of Directors for the American Rhinologic Society and has developed a multitude of educational materials for both physicians and patients to help them better understand rhinologic disorders. She is passionate about educating patients to allow them to make the best decisions about their own care, leading to better outcomes.

Dr. Patel has published widely in topics such as avoiding complications in endoscopic sinus surgery, chronic rhinosinusitis in the immunosuppressed patient population, new devices and techniques for endoscopic skull base surgery, and olfactory dysfunction. She continues to perform research in these areas, and is beginning collaborative efforts with neuroscientists and engineers to develop technology that she hopes will eventually help cure patients with olfactory loss.

## CLINICAL FOCUS

- Endoscopic Sinus and Skull Base Surgery
- Chronic Rhinosinusitis
- Benign and Malignant Sinus and Skull Base Tumors
- Olfaction and Olfactory Disorders
- Cerebrospinal Fluid Leaks
- Sinusitis
- Nasal Obstruction
- Epiphora, Orbital Tumors, Orbital decompression
- Pituitary Surgery
- Rhinology
- Otolaryngology

## ACADEMIC APPOINTMENTS

- Associate Professor - Med Center Line, Otolaryngology - Head & Neck Surgery Divisions
- Associate Professor - Med Center Line (By courtesy), Neurosurgery

## ADMINISTRATIVE APPOINTMENTS

- Director of Endoscopic Skull Base Surgery, Department of Otolaryngology - Head and Neck Surgery, (2017- present)
- Director Rhinology Fellowship, Department of Otolaryngology-Head and Neck Surgery, Stanford University, (2015- present)

## HONORS AND AWARDS

- Fellow, American Rhinologic Society (2016)
- Woodruff Teaching Award, Emory University (2014)
- Mount Sinai Resident Teaching Award, Mount Sinai Medical School (2010)
- First Place, New York City Otolaryngology Resident Research Day (2008)
- Leadership Grant, American Academy of Otolaryngology (2007, 2008)
- Campbell Scholarship, Oregon Health and Sciences University (2004)
- Inductee, National Medical Honors Society, Alpha Omega Alpha (2004)
- OHSU Rose Award, Oregon Health and Sciences University (2003)
- Miller Memorial Fund Scholarship, University of Missouri (2001-2003)
- Hughes Academic Achievement Award, State of Missouri (2000)
- Inductee, National Honor Society, Phi Bet Kappa (2000)
- Inductee, National Honor Society, Phi Eta Sigma (1998)
- Bright Flight Scholarship, University of Missouri (1997-2001)
- National Merit Finalist, National Merit Scholarship Corporation (1997)

## BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Board of Directors, American Rhinologic Society (2018 - present)
- Member, Scientific Program Committee, American Academy of Otolaryngology (2016 - present)
- Chair, Education Committee, American Rhinologic Society (2014 - 2017)
- Member, Adult Sinusitis Guideline Committee, American Academy of Otolaryngology (2014 - 2015)
- Member, Rhinology and Allergy Education Committee, American Academy of Otolaryngology (2013 - present)
- Member, Legislative Representatives Committee, Board of Governors, American Academy of Otolaryngology (2012 - present)
- Member, Program Committee, American Rhinologic Society (2012 - 2016)

## PROFESSIONAL EDUCATION

- Residency: Icahn School of Medicine at Mount Sinai Registrar (2010) NY

- Internship: Icahn School of Medicine at Mount Sinai Registrar (2006) NY
- Board Certification: Otolaryngology, American Board of Otolaryngology (2011)
- Fellowship: Stanford School of Medicine (2011) CA
- Medical Education: Oregon Health Science University (2005) OR

## Publications

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### PUBLICATIONS

- **The Horizon Sign and Frontal Bar: Two Topographic Landmarks to Confirm Endoscopic Frontal Sinusotomy.** *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*  
Walgama, E. S., Thamboo, A., Tangbumrungham, N., Ayoub, N., Patel, Z. M., Nayak, J. V.  
2019; 194599818825472
- **Imaging predictors for malignant transformation of inverted papilloma.** *The Laryngoscope*  
Yan, C. H., Tong, C. C., Penta, M., Patel, V. S., Palmer, J. N., Adappa, N. D., Nayak, J. V., Hwang, P. H., Patel, Z. M.  
2018
- **Therapeutic use of steroids in non-chronic rhinosinusitis olfactory dysfunction: a systematic evidence-based review with recommendations.** *International forum of allergy & rhinology*  
Yan, C. H., Overdevest, J. B., Patel, Z. M.  
2018
- **Oncologic management of sinonasal undifferentiated carcinoma.** *Current opinion in otolaryngology & head and neck surgery*  
Tyler, M. A., Holmes, B., Patel, Z. M.  
2018
- **Trans-Oral Endoscopic Resection of High Cervical Osteophytes with Long-term Symptom Resolution: Case Series, Imaging, and Literature Review.** *World neurosurgery*  
Jabarkheel, R., Chen, Y., Xu, L., Yan, C. H., Patel, Z. M., Desai, A. M.  
2018
- **Precision medicine: why surgeons deviate from "appropriateness criteria" in the management of chronic rhinosinusitis and effects on outcomes.** *International forum of allergy & rhinology*  
Thamboo, A., Rathor, A., Borchard, N. A., Nayak, J. V., Hwang, P. H., Patel, Z. M.  
2018
- **Budesonide irrigation with olfactory training improves outcomes compared with olfactory training alone in patients with olfactory loss.** *International forum of allergy & rhinology*  
Nguyen, T. P., Patel, Z. M.  
2018
- **Porcine small intestine submucosal grafts improve remucosalization and progenitor cell recruitment to sites of upper airway tissue remodeling.** *International forum of allergy & rhinology*  
Nayak, J. V., Rathor, A., Grayson, J. W., Bravo, D. T., Velasquez, N., Noel, J., Beswick, D. M., Riley, K. O., Patel, Z. M., Cho, D., Dodd, R. L., Thamboo, A., Choby, et al  
2018
- **Comparison of outcomes following culture-directed vs non-culture-directed antibiotics in treatment of acute exacerbations of chronic rhinosinusitis.** *International forum of allergy & rhinology*  
Yan, C. H., Tangbumrungham, N., Maul, X. A., Ma, Y., Nayak, J. V., Hwang, P. H., Patel, Z. M.  
2018
- **Risk Stratification for Postoperative Venous Thromboembolism after Endoscopic Sinus Surgery** *OTOLARYNGOLOGY-HEAD AND NECK SURGERY*  
Beswick, D. M., Vaezaefshar, R., Ma, Y., Hwang, P. H., Nayak, J. V., Patel, Z. M.  
2018; 158 (4): 767-73
- **Outcomes After Endoscopic Endonasal Resection of Craniopharyngiomas in the Pediatric Population** *WORLD NEUROSURGERY*  
Patel, V. S., Thamboo, A., Quon, J., Nayak, J. V., Hwang, P. H., Edwards, M., Patel, Z. M.

2017; 108: 6–14

- **Evidence for altered levels of IgD in the nasal airway mucosa of patients with chronic rhinosinusitis** *JOURNAL OF ALLERGY AND CLINICAL IMMUNOLOGY*  
Min, J., Nayak, J. V., Hulse, K. E., Stevens, W. W., Raju, P. A., Huang, J. H., Suh, L. A., Van Roey, G. A., Norton, J. E., Carter, R. G., Price, C. E., Weibman, A. R., Rathan, et al  
2017; 140 (6): 1562-+
- **Enhanced Tearing by Electrical Stimulation of the Anterior Ethmoid Nerve** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*  
Brinton, M., Kossler, A. L., Patel, Z. M., Loudin, J., Franke, M., Ta, C. N., Palanker, D.  
2017; 58 (4): 2341-2348
- **Surgical therapy vs continued medical therapy for medically refractory chronic rhinosinusitis: a systematic review and meta-analysis.** *International forum of allergy & rhinology*  
Patel, Z. M., Thamboo, A., Rudmik, L., Nayak, J. V., Smith, T. L., Hwang, P. H.  
2017; 7 (2): 119-127
- **Office Procedures in Refractory Chronic Rhinosinusitis** *OTOLARYNGOLOGIC CLINICS OF NORTH AMERICA*  
Thamboo, A., Patel, Z. M.  
2017; 50 (1): 113-?
- **The evidence for olfactory training in treating patients with olfactory loss** *CURRENT OPINION IN OTOLARYNGOLOGY & HEAD AND NECK SURGERY*  
Patel, Z. M.  
2017; 25 (1): 43-46
- **Successful repair of intraoperative cerebrospinal fluid leaks improves outcomes in endoscopic skull base surgery** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Shahangian, A., Soler, Z. M., Baker, A., Wise, S. K., Reredy, S. K., Patel, Z. M., Oyesiku, N. M., DelGaudio, J. M., Hadjipanayis, C. G., Woodworth, B. A., Riley, K. O., Lee, J., Cusimano, et al  
2017; 7 (1): 80-86
- **Nose blowing after endoscopic sinus surgery does not adversely affect outcomes.** *The Laryngoscope*  
Ayoub, N., Chitsuthipakorn, W., Nayak, J. V., Patel, Z. M., Hwang, P. H.  
2017
- **Barosinusitis: Comprehensive review and proposed new classification system.** *Allergy & rhinology (Providence, R.I.)*  
Vaezaafshar, R., Psaltis, A. J., Rao, V. K., Zarabanda, D., Patel, Z. M., Nayak, J. V.  
2017; 8 (3): 109–17
- **Equivalence in outcomes between Draf 2B vs Draf 3 frontal sinusotomy for refractory chronic frontal rhinosinusitis.** *International forum of allergy & rhinology*  
Patel, V. S., Choby, G., Shih, L. C., Patel, Z. M., Nayak, J. V., Hwang, P. H.  
2017
- **Variables associated with olfactory disorders in adults: A U.S. population-based analysis.** *World journal of otorhinolaryngology - head and neck surgery*  
Noel, J., Habib, A. R., Thamboo, A., Patel, Z. M.  
2017; 3 (1): 9–16
- **The prevalence of Eustachian tube dysfunction symptoms in patients with chronic rhinosinusitis.** *International forum of allergy & rhinology*  
Tangbumrungham, N., Patel, V. S., Thamboo, A., Patel, Z. M., Nayak, J. V., Ma, Y., Choby, G., Hwang, P. H.  
2017
- **Randomized Controlled Trial Demonstrating Cost-Effective Method of Olfactory Training in Clinical Practice** *Laryngoscope Investigative Otolaryngology*  
Patel, Z. M., Wise, S. K., DelGaudio, J. M.  
2017
- **Factors impacting cerebrospinal fluid leak rates in endoscopic sellar surgery.** *International forum of allergy & rhinology*  
Karnezis, T. T., Baker, A. B., Soler, Z. M., Wise, S. K., Reredy, S. K., Patel, Z. M., Oyesiku, N. M., DelGaudio, J. M., Hadjipanayis, C. G., Woodworth, B. A., Riley, K. O., Lee, J., Cusimano, et al  
2016; 6 (11): 1117-1125

- **Determinants of racial differences in survival for sinonasal cancer.** *Laryngoscope*  
Patel, Z. M., Li, J., Chen, A. Y., Ward, K. C.  
2016; 126 (9): 2022-2028
- **Immunotherapy compliance: comparison of subcutaneous versus sublingual immunotherapy** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Leader, B. A., Rotella, M., Stillman, L., DelGaudio, J. M., Patel, Z. M., Wise, S. K.  
2016; 6 (5): 460-464
- **Olfaction following endoscopic skull base surgery** *CURRENT OPINION IN OTOLARYNGOLOGY & HEAD AND NECK SURGERY*  
Patel, Z. M., DelGaudio, J. M.  
2016; 24 (1): 70-74
- **Multi-institutional study of risk factors for perioperative morbidity following transnasal endoscopic pituitary adenoma surgery** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Boling, C. C., Karnezis, T. T., Baker, A. B., Lawrence, L. A., Soler, Z. M., Vandergrift, W. A., Wise, S. K., DelGaudio, J. M., Patel, Z. M., Reredy, S. K., Lee, J. M., Khan, M. N., Govindaraj, et al  
2016; 6 (1): 101-107
- **Management of non-invasive rhinosinusitis in the immunosuppressed patient population** *LARYNGOSCOPE*  
Dao, A. M., Reredy, S. K., Wise, S. K., DelGaudio, J. M., Patel, Z. M.  
2015; 125 (8): 1767-1771
- **Magnetic resonance cisternogram with intrathecal gadolinium with delayed imaging for difficult to diagnose cerebrospinal fluid leaks of anterior skull base** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
DelGaudio, J. M., Baugnon, K. L., Wise, S. K., Patel, Z. M., Aiken, A. H., Hudgins, P. A.  
2015; 5 (4): 333-338
- **Clinical Practice Guideline (Update): Adult Sinusitis** *OTOLARYNGOLOGY-HEAD AND NECK SURGERY*  
Rosenfeld, R. M., Piccirillo, J. F., Chandrasekhar, S. S., Brook, I., Kumar, K. A., Kramper, M., Orlandi, R. R., Palmer, J. N., Patel, Z. M., Peters, A., Walsh, S. A., Corrigan, M. D.  
2015; 152: S1-S39
- **Clinical Practice Guideline (Update): Adult Sinusitis Executive Summary** *OTOLARYNGOLOGY-HEAD AND NECK SURGERY*  
Rosenfeld, R. M., Piccirillo, J. F., Chandrasekhar, S. S., Brook, I., Kumar, K. A., Kramper, M., Orlandi, R. R., Palmer, J. N., Patel, Z. M., Peters, A., Walsh, S. A., Corrigan, M. D.  
2015; 152 (4): 598-609
- **Association of Decreased Rate of Influenza Vaccination With Increased Subjective Olfactory Dysfunction** *JAMA OTOLARYNGOLOGY-HEAD & NECK SURGERY*  
Flanagan, C. E., Wise, S. K., DelGaudio, J. M., Patel, Z. M.  
2015; 141 (3): 225-228
- **Higher Body Mass Index Is Associated with Subjective Olfactory Dysfunction** *BEHAVIOURAL NEUROLOGY*  
Patel, Z. M., DelGaudio, J. M., Wise, S. K.  
2015
- **Multi-institutional study of risk factors for perioperative morbidity following transnasal endoscopic pituitary adenoma surgery.** *International Forum of Allergy and Rhinology*  
Boling, C.  
2015
- **Endoscopic transsphenoidal pituitary surgery: transsphenoidal approach to the sella and sellar closure with septal flap: 3-dimensional operative video.** *Neurosurgery*  
Chu, J., Wise, S. K., Patel, Z. M., Oyesiku, N. M.  
2014; 10: 654-?
- **The nasal floor pedicled flap: a novel technique for use in skull base reconstruction** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Daraei, P., Oyesiku, N. M., Patel, Z. M.  
2014; 4 (11): 937-943
- **Evaluation and Management of "Sinus Headache" in the Otolaryngology Practice** *OTOLARYNGOLOGIC CLINICS OF NORTH AMERICA*

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- Patel, Z. M., Setzen, M., Poetker, D. M., DelGaudio, J. M.  
2014; 47 (2): 269-?
- **Practice patterns regarding noninvasive rhinosinusitis in the immunosuppressed patient population.** *Allergy & rhinology (Providence, R.I.)*  
Patel, Z. M.  
2013; 4 (3): e151-4
  - **Comparing use of the Sonopet((R)) ultrasonic bone aspirator to traditional instrumentation during the endoscopic transsphenoidal approach in pituitary tumor resection** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Baddour, H. M., Lupa, M. D., Patel, Z. M.  
2013; 3 (7): 588-591
  - **Concurrent functional endoscopic sinus surgery and septorhinoplasty: using evidence to make clinical decisions** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Patel, Z. M., Setzen, M., Sclafani, A. P., Del Gaudio, J. M.  
2013; 3 (6): 488-492
  - **"Sinus headache": rhinogenic headache or migraine? An evidence-based guide to diagnosis and treatment** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Patel, Z. M., Kennedy, D. W., Setzen, M., Poetker, D. M., DelGaudio, J. M.  
2013; 3 (3): 221-230
  - **Low-frequency pulsed ultrasound in the nasal cavity and paranasal sinuses: a feasibility and distribution study** *INTERNATIONAL FORUM OF ALLERGY & RHINOLOGY*  
Patel, Z. M., Hwang, P. H., Chernomorsky, A., Bravo, D. T., Nguyen, B. L., Nesterova, K., Nayak, J. V.  
2012; 2 (4): 303-308
  - **The Prevention and Management of Complications in Ethmoid Sinus Surgery** *OTOLARYNGOLOGIC CLINICS OF NORTH AMERICA*  
Patel, Z. M., Govindaraj, S.  
2010; 43 (4): 855-?
  - **The evolution of management for inverted papilloma: An analysis of 200 cases** *OTOLARYNGOLOGY-HEAD AND NECK SURGERY*  
Lawson, W., Patel, Z. M.  
2009; 140 (3): 330-335
  - **The Development and Pathologic Processes that Influence Maxillary Sinus Pneumatization** *ANATOMICAL RECORD-ADVANCES IN INTEGRATIVE ANATOMY AND EVOLUTIONARY BIOLOGY*  
Lawson, W., Patel, Z. M., Lin, F. Y.  
2008; 291 (11): 1554-1563