

MASSACHUSETTS EYE AND EAR INFIRMARY

Quality and Outcomes 2012



Massachusetts  
Eye and Ear

## Clinical Leadership in Quality: 2011-2012



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*Chief Information Officer*

## A Letter from the President



Dear Colleagues in Healthcare,

Massachusetts Eye and Ear is proud to present the 2012 edition of Quality and Outcomes. Great outcomes are a direct result of highest-quality care and a commitment to continue to improve. At Mass. Eye and Ear, we are very proud of the many individuals — from the surgeons, to the nurses, to the front-line staff — who elevate that level of care each and every day. Their commitment and passion to create the best outcomes for our patients makes a tremendous difference in improving those patients' quality of life.

Thanks to leadership from our Department Chairs (Joseph B. Nadol, Jr., M.D.; Joan W. Miller, M.D.; Hugh Curtin, M.D.; Sunil Eappen, M.D.), the Mass. Eye and Ear quality program continuously sets the highest standard of care for our ever-evolving specialties. Serving a largely outpatient population, Mass. Eye and Ear has just 41 inpatient beds, but upwards of 20,000 surgical patients each year. While challenging, creating measures and benchmarks specifically for these specialties brings great rewards. We realize that the first step in improving quality and outcomes comes from being able to measure them. You can't get better (and demonstrate that you are better) unless you can measure and display where you are now. We are setting the standard in the United States, and indeed the world, with our commitment to publish outcomes.

In the pages that follow you will also learn of Mass. Eye and Ear's dedication to patient safety, collaboration-in-care, technologic advances, and clinical research — all with a focus on improving patient treatments and, ultimately, finding cures.

Mass. Eye and Ear has long focused on Accessibility, Affordability and Accountability in healthcare. We hold ourselves accountable to providing and producing the very best outcomes for eye, ENT and head and neck cancer patients. This triple-A standard is just one way we define high quality.

We hope you find this publication helpful. For an electronic version of this report and to see new innovations from Mass. Eye and Ear, please log on to [MassEyeAndEar.org/Quality](http://MassEyeAndEar.org/Quality).

A handwritten signature in blue ink that reads "John Fernandez". The signature is fluid and cursive, with the first name "John" being more prominent.

**John Fernandez**  
*President & CEO,*  
*Massachusetts Eye and Ear*

*Please note that information contained in this book focuses primarily on the work of the full-time staff at Mass. Eye and Ear's main Boston campus, unless otherwise stated.*

## About Massachusetts Eye and Ear

Founded in 1824, the Massachusetts Eye and Ear Infirmary is a pre-eminent specialty, teaching and research hospital dedicated to caring for disorders of the eyes, ears, nose, throat, head and neck. Our dedicated staff provides primary and subspecialty care and serves as a referral center for inpatient and outpatient medical and surgical care.

Mass. Eye and Ear is the leading authority in its specialties throughout the northeast and is a resource globally for advances in patient care, research and education. As the primary academic center for Harvard Medical School's Departments of Ophthalmology and Otolaryngology, we are deeply committed to providing a superb education to the next generation of visionary healthcare leaders. Our world-renowned experts are continuously innovating in the fields of translational and bench research, turning insights into cures that benefit countless people. We continue to forge new partnerships and alliances — locally, nationally and beyond our borders — to increase our reach and make our expertise, services and resources available to all who need them.

Pivotal to our clinical quality efforts is the use of the Longitudinal Medical Record (LMR), an integrated and secure system of communication and medical record sharing among the majority of Harvard Medical School's network of hospitals and affiliates. This network facilitates quick and easy communication among referring physicians and Mass. Eye and Ear's consulting ophthalmologists, otolaryngologists and radiologists. It also enables our physicians to instantly tap our in-house specialists, affording seamless and rapid access to some of the best ophthalmology and otolaryngology resources available.

### Fiscal Year 2011 Volume

Outpatient service.....	277,512
Ambulatory surgery services.....	19,880
Inpatient surgical services.....	1,185
Emergency Department Services.....	19,297
Discharges.....	1,475
Fiscal Year 2011 beds.....	41
Fiscal Year 2011 Overall Operating Revenue.....	\$279,741,869

### Clinical Locations

- Boston – Main Campus
- Boston – Longwood
- Boston – Joslin
- Braintree
- Concord
- Duxbury
- East Bridgewater
- Milton
- Newton
- Quincy
- Stoneham
- Weymouth

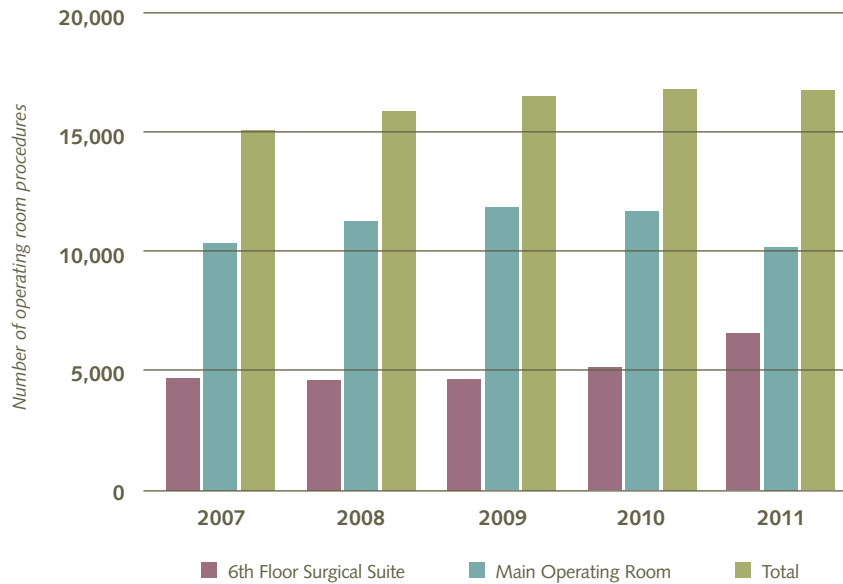
For more information, please visit [MassEyeAndEar.org](http://MassEyeAndEar.org).

## SURGERY OVERVIEW

The perioperative team at Mass. Eye and Ear cares for a very specialized group of patients from around Boston, New England, the country and the world. We strive to offer the best quality of care to those who need Ophthalmology and Otolaryngology surgery. But what does that mean for patients and providers, and how do we measure it?

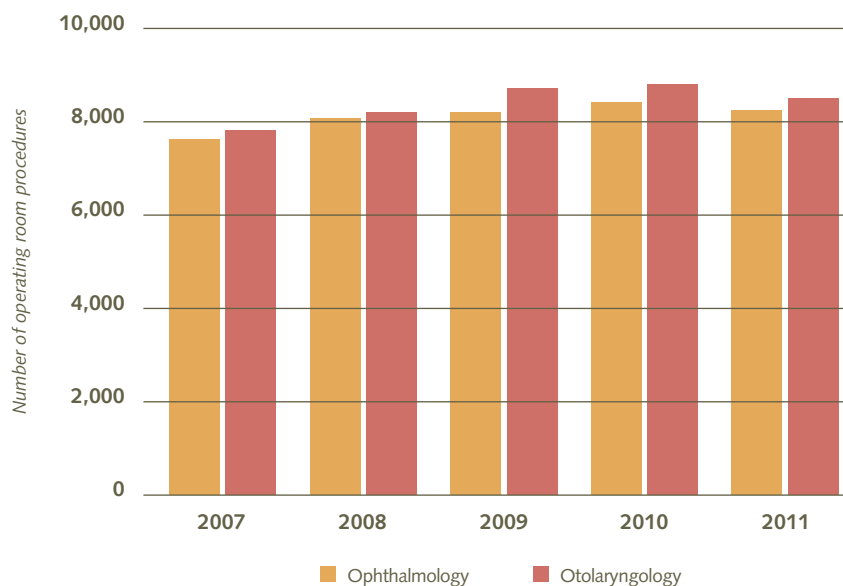
Here we report on a few key surgical factors that demonstrate our commitment to high quality care and its impact on our patients and their caregivers. By publishing our results, we hope to encourage other hospitals to take similar measures with the goal of continuing to improve national outcomes standards. Together, we strive to ensure that every patient receives the best care possible.

## Mass. Eye and Ear Surgical Volume (Main Campus)



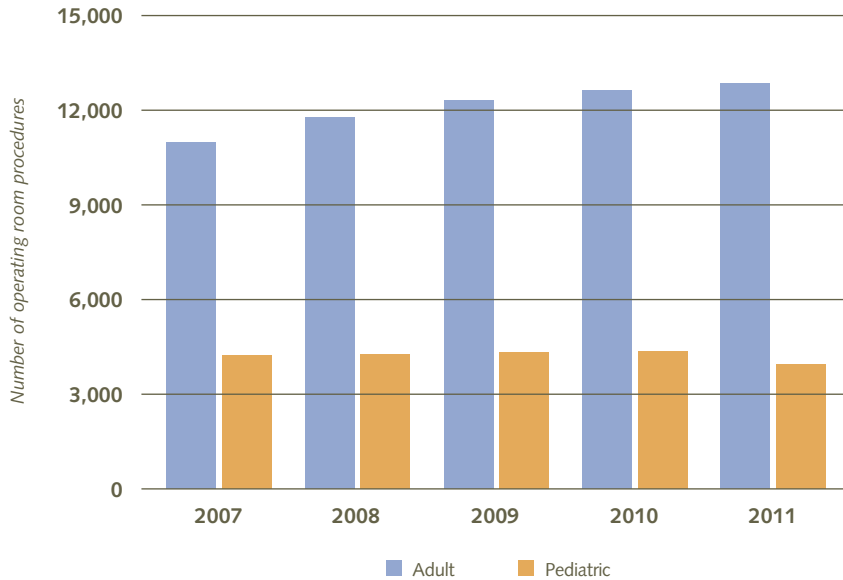
Mass. Eye and Ear has 17 operating rooms at its main campus that are split between a Main Operating Room (MOR) which has 12 rooms and a 6th Floor Surgical Suite which has five rooms. The majority of the cases that occur in the 6th Floor Surgical Suite are ophthalmic, relatively short, and have 99% of the patients going home on the same day of surgery. The MOR handles the majority of otolaryngology procedures as well as the majority of the pediatric surgery we perform. All of the urgent and emergency cases that occur in the evenings and weekends are treated in the MOR.

## Ophthalmology and Otolaryngology Surgical Volume



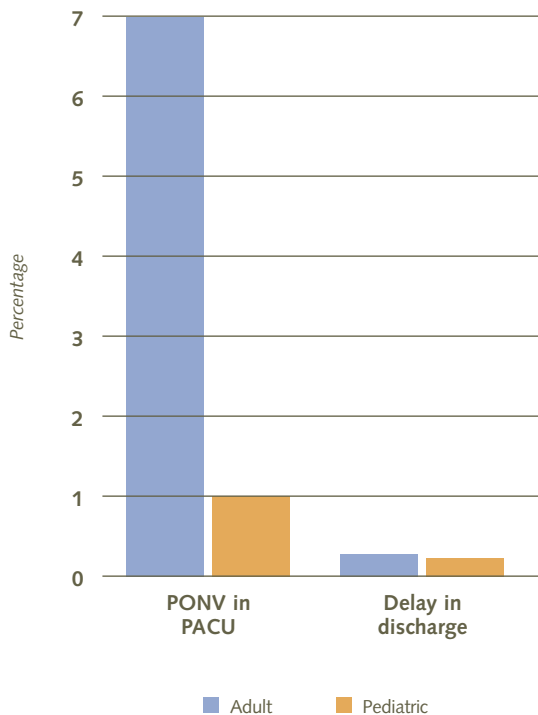
The Ophthalmology and Otolaryngology surgical volumes are split fairly evenly, and the numbers have been consistently rising over the last several years.

## Adult versus Pediatric Volume



Mass. Eye and Ear cares for the most pediatric otolaryngologic patients in the area and for more pediatric surgical patients than any hospital except Boston Children's Hospital. Pediatric surgical volume has remained a little more than one-third of Mass. Eye and Ear's overall volume over the last few years.

## Postoperative Nausea and Vomiting (PONV) in the Post Anesthesia Care Unit (PACU)

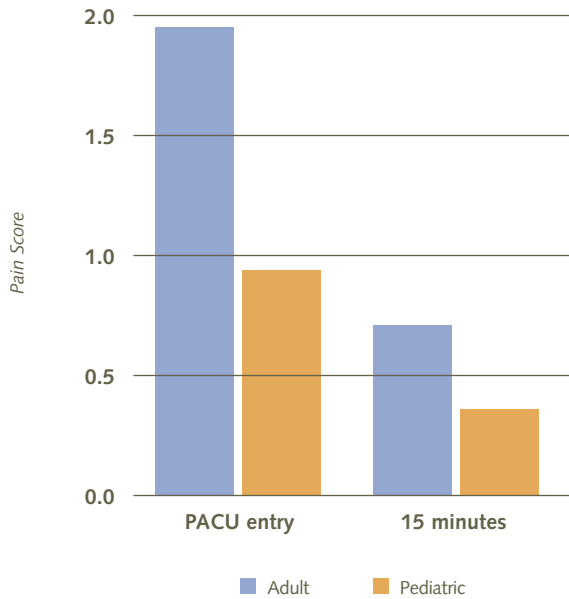


These numbers reflect patients who had nausea and/or vomiting in the PACU despite therapy in the operating room and required additional treatment to alleviate their discomfort. The delay in discharge criteria reported reflects the number of patients who continued to have prolonged nausea despite additional therapy. Typical reports of PONV range from 20-30% incidence.

The data reflect a sample subset of our total patient population who went through the recovery room. (N = 3,712 for adults and N = 2,203 for pediatric patients)

Nausea is one of the most common and troublesome complications occurring after surgery in both pediatric and adult patients. Additionally, it is well known that patients undergoing ophthalmic and otolaryngologic procedures are at significantly higher risk of postoperative nausea and vomiting (PONV) when compared to patients having other types of surgery. As a result, nearly every one of our patients receives prophylactic treatment with the latest combination of appropriate antiemetic medications in order to minimize the chances of PONV.

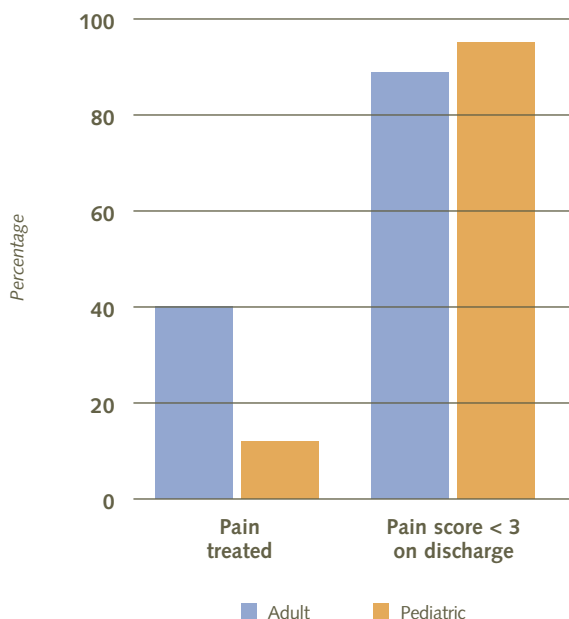
## Pain Score in the Post Anesthesia Care Unit (PACU)



Using these 0-10 scales, our goal is to treat pain above a '3' and discharge patients from the PACU with scores less than 3.

We report a sample subset of patients from 2010. (N = 3,274 for adults and N = 1,896 for pediatric patients.)

## Treatment Success of Pain in the PACU



Using these 0-10 scales, our goal is to treat pain above a '3' and discharge patients from the PACU with scores less than 3.

We report a sample subset of patients from 2010. (N = 3,274 for adults and N = 1,896 for pediatric patients.)

Pain after surgery is one of patients' most common fears. Our goal is to have patients awakened in the operating room and arrive in the Post Anesthesia Care Unit (PACU) or recovery room as comfortable as possible. Often in the recovery room, the patient may need more analgesics prior to leaving. Our goal is to ensure that as many patients as possible leave this area either to home or to their hospital room comfortable.

We use a 10-point visual analog score for adults to self-report their pain. The scores reported above reflect the adults' perception of their own pain assessment and their request for pain medications.

For pediatric patients old enough to assess their own scores, we use the same 10-point scale as used for adults. For patients too young to use the scale, the nurses in the PACU use the FLACC (Facial-Legs-Arms-Crying-Comfortable) scale that attributes behavioral characteristics to a 10-point pain scale. These are the scores reported above for pediatric patients.



OPHTHALMOLOGY DEPARTMENT

At the Mass. Eye and Ear/Harvard Medical School Department of Ophthalmology, we have nearly two centuries of experience in developing innovative approaches to treating eye disease and reducing blindness worldwide. We founded subspecialty training in cornea, retina and glaucoma, and have pioneered tools and treatments for numerous diseases and conditions ranging from retinal detachment to age-related macular degeneration to corneal scarring. Our core values are patient-centered and focus on delivering the highest quality of care through education, innovation and service excellence.

MASS. EYE AND EAR DEPARTMENT OF OPHTHALMOLOGY

- Primary teaching hospital of Harvard Medical School's Department of Ophthalmology.
- Home to Schepens Eye Research Institute, Retina Research Institute, Howe Laboratory of Ophthalmology, Berman-Gund Laboratory for the Study of Retinal Degenerations, and the Ocular Genomics Institute.

## Clinical Affiliations

- Massachusetts General Hospital (MGH) Department of Ophthalmology
  - Mass. Eye and Ear provides comprehensive and subspecialty care, including Neuro-Ophthalmology and Burn Unit consultations and coordination of inpatient consultations for urgent patient care concerns at MGH.
  - High-risk patients are screened by Mass. Eye and Ear staff for diabetic eye disease through the MGH Chelsea Health Center teleretinal screening program.
- Joslin Diabetes Center/Beetham Eye Institute
  - Mass. Eye and Ear and Beetham Eye Institute clinicians provide coordinated, integrated and comprehensive care in preventing, diagnosing and treating eye problems related to diabetes.
  - Our clinical alliance provides coordinated care to eye patients throughout greater Boston, especially those with or at-risk for diabetic-related eye disease.
- Brigham and Women's Hospital (BWH)
  - Mass. Eye and Ear staff provides 24/7 eye trauma coverage and inpatient subspecialty care and consultations at BWH. An outpatient comprehensive ophthalmology service (One Joslin Place) provides follow-up care to BWH patients and is staffed by Mass. Eye and Ear physicians with participation from Joslin retina specialists.
- Children's Hospital Ophthalmology Foundation (CHOF)
  - Mass. Eye and Ear ophthalmologists provide subspecialty care in glaucoma and cornea disease at Boston Children's Hospital.
  - Children's Hospital ophthalmologists staff the comprehensive pediatric ophthalmology and strabismus clinic at Mass. Eye and Ear.

## Ophthalmology Resources at Mass. Eye and Ear

- Full spectrum of primary and subspecialty ophthalmic care.
- Highly skilled ophthalmic teams staff each clinical area.
- Dedicated 24/7 eye emergency department.
- Morse Laser Center provides advanced laser procedures using state-of-the-art refractive, glaucoma, retinal and anterior segment lasers.
- Ocular Surface Imaging Center enables rapid, non-invasive corneal biopsies.
- Electroretinography Service performs evaluations of patients with retinal disease referred for diagnosis, prognosis, genetic counseling and treatment.
- The David Glendenning Cogan Laboratory of Ophthalmic Pathology provides enhanced diagnostic services in conjunction with the Mass General Surgical Pathology Service.
- The Howe Library houses one of the most extensive ophthalmology research collections in the world.
- Full service Contact Lens Service specializes in therapeutic fits, bandage and specialty contact lenses.
- Mass. Eye and Ear Medical Unit, staffed by MGH physicians.
- Mass. Eye and Ear Radiology Department houses a dedicated MRI/CT imaging suite.
- Dedicated Social Work and Discharge Planning Department.
- The International Program offers patients assistance with appointments, transportation, accommodations and language translation.

## Academic Affiliations

Massachusetts General Hospital

Brigham and Women's Hospital

Beth Israel Deaconess  
Medical Center

Joslin Diabetes Center/  
Beetham Eye Institute

Boston Children's Hospital

Veterans Affairs Boston  
Healthcare System

VA Maine Healthcare System

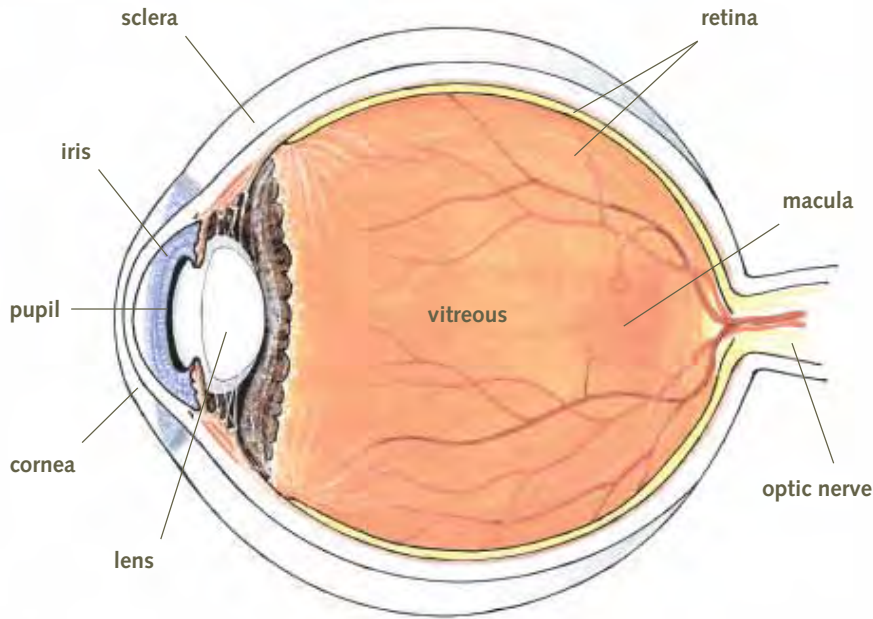
Cambridge Health Alliance

Aravind Hospital, India

Eye and ENT Hospital of Fudan  
University, Shanghai, China

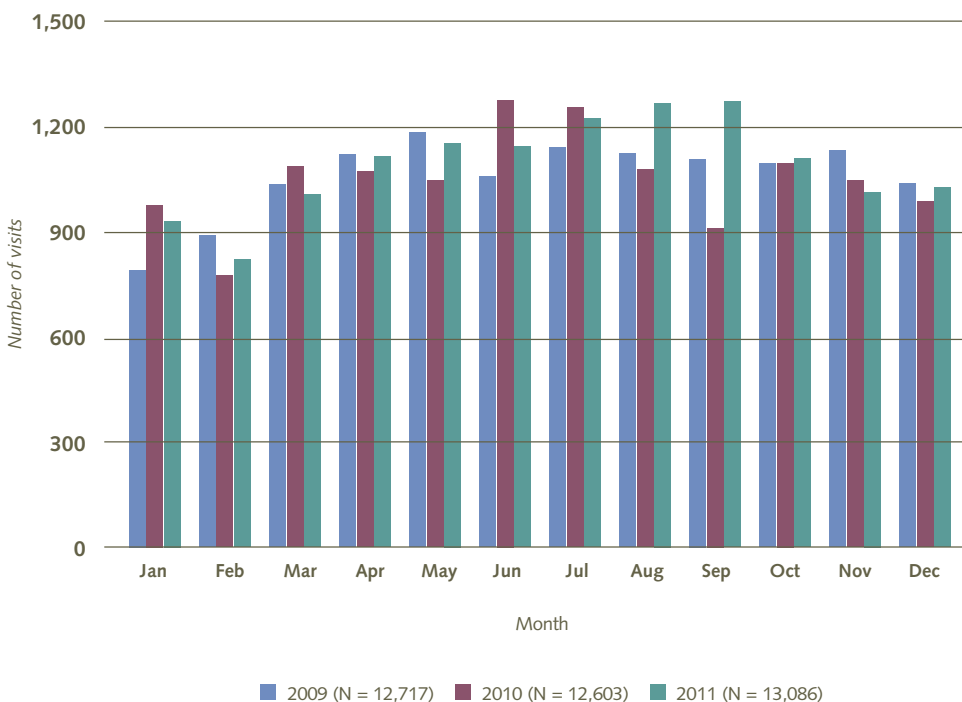
For more information about  
the Mass. Eye and Ear Quality  
Program or the Department  
of Ophthalmology, please  
visit our website at  
[www.MassEyeAndEar.org](http://www.MassEyeAndEar.org).

## Eye Anatomy



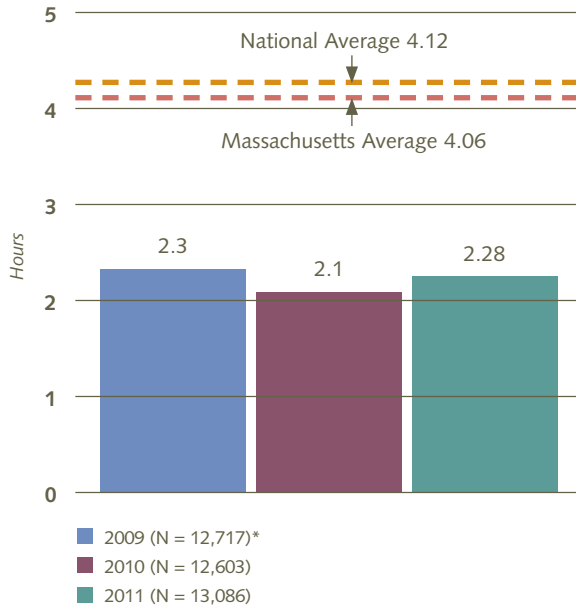
Data reported for 2010 and 2011 represent calendar years. The 2009 data represent 12 month results as noted.

## Emergency Department: Ophthalmology Emergency Visits



This bar graph shows the number of ophthalmology patients seen monthly by the Mass. Eye and Ear Emergency Department during the 2009, 2010 and 2011 calendar years. During this three year period, the Emergency Department maintained a high volume of ophthalmic emergency visits, with an average of 1,060 patients per month in 2009, 1,050 in 2010, and 1,091 in 2011. Patient volume generally increases in the summer.

## Emergency Department: Ophthalmology Visit Times

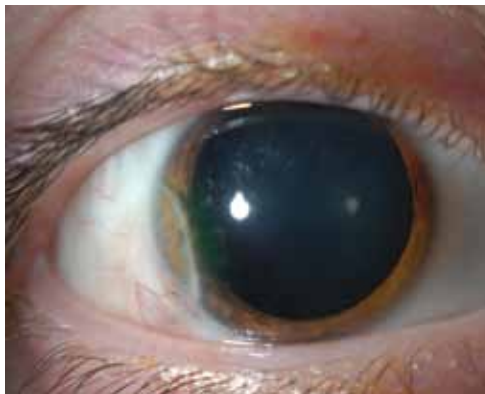


\*October 2008 – September 2009

The average ophthalmology visit time in the Mass. Eye and Ear Emergency Department for 2011 was 2.28 hours. The 2011 average visit time was similar to 2009 and 2010 visit times, which were 2.3 and 2.1 hours, respectively. The average visit time is defined as the total time from when the patient walked in the door at the Mass. Eye and Ear Emergency Department to when the patient walked out the door after having seen the ophthalmologist. According to the 2010 Press Ganey Emergency Department Pulse Report, patients across the United States spent an average of four hours and seven minutes (4.12 hours) per ER visit. The Massachusetts (State) average visit time was 4.06 hours.

For the past three years, the average ophthalmology visit time in the Mass. Eye and Ear Emergency Department was almost half the average national and state visit times.

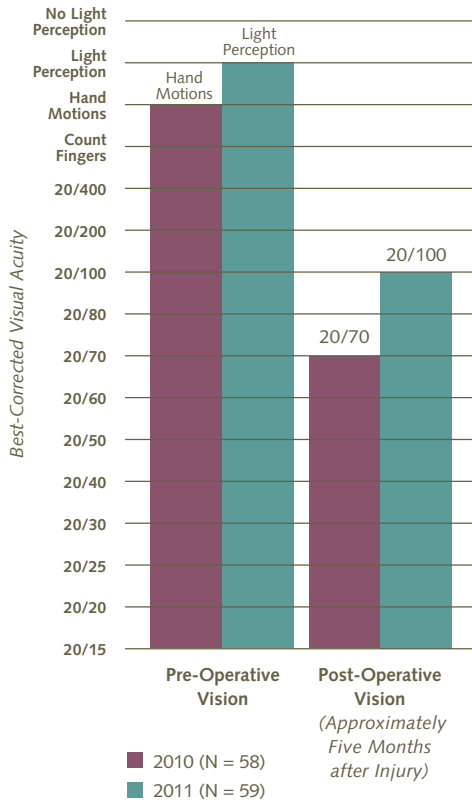
## Eye Trauma Surgery



The photos on the left illustrate the right eye of a patient before and after eye trauma surgery. At presentation to the Mass. Eye and Ear Emergency Department, the patient's pre-operative vision was "hand motions" (left photo). The patient's post-operative vision was 20/20 (right photo).

*Photos courtesy of  
Justin Kanoff, M.D.*

## Eye Trauma Surgery: Post-Operative Median Vision



During the 2011 calendar year, 98 patients had open-globe repair by the Mass. Eye and Ear Eye Trauma Service. Of these 98 patients, visual acuity at presentation was recorded in 96 patients. Visual acuity was not possible in two patients: one suffered from dementia and one was an infant. Fifty-nine patients had five months or more of follow-up, and only these individuals were analyzed for pre- and post-operative vision. Patients with less than five months of follow-up were excluded from the analysis. During the 2011 calendar year, the median pre-operative vision was "light perception," and the median post-operative vision at the closest follow-up visit after five months was 20/100. When all 2011 open-globe repairs were included in the analysis regardless of follow-up time, the best post-operative median vision was 20/40.

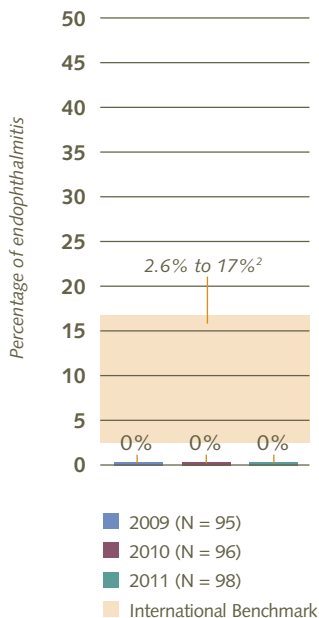
Eye trauma surgical results from calendar year 2011 were similar to those from calendar year 2010, when data collection for median vision began. During 2010, the Trauma Service performed 96 open-globe repairs. Of these 96 patients, 58 patients had five months or more of follow-up and were analyzed for pre- and post-operative vision. In 2010, the median pre-operative vision was "hand motions" and the median post-operative vision at the closest follow-up visit after five months was 20/70.

Reference: <sup>1</sup>Shah AS, Andreoli MT, Andreoli CM, Heidary G. "Pediatric open-globe injuries: A large scale, retrospective review." Poster presented at the 37th Annual Meeting of the American Association for Pediatric Ophthalmology and Strabismus, San Diego, California, USA, March 30-April 3, 2011. Abstract available in J AAPOS 2011; 15(1), e29.

In a retrospective review of 124 pediatric open-globe injuries managed by the Eye Trauma Service and/or Retina Service between February 1999 and April 2009, analysis showed a median visual acuity at presentation of "hand motions" (N = 123), and a final best-corrected median visual acuity of 20/40 (N = 124) at ten months median follow-up.<sup>1</sup>

Visual prognosis after ocular trauma is highly dependent on the severity of the initial trauma, but these data show that patients suffering from traumatic eye rupture can regain useful vision after surgery.

## Eye Trauma Surgery: Rates of Endophthalmitis after Open-Globe Repair



During calendar year 2011, 98 patients had open-globe repair by the Eye Trauma Service, with no cases of endophthalmitis reported. This is similar to calendar year 2009 and 2010 results, where no cases of endophthalmitis were reported among the 95 and 96 patients, respectively, who had open-globe repair by the Eye Trauma Service.

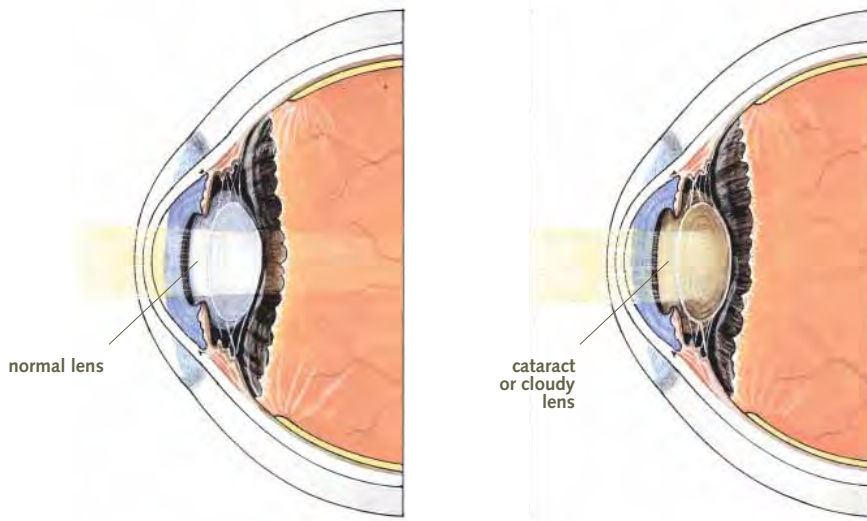
During a 7.5-year period (January 2000 to July 2007), 675 open-globe injuries were treated at Mass. Eye and Ear. Intravenous vancomycin and ceftazidime were started on admission and stopped after 48 hours. Patients were discharged on topical antibiotics, corticosteroids, and cycloplegia. Of these 675 eyes, 558 had at least 30 days of follow-up (mean, 11 months). The overall percentage of endophthalmitis was 0.9% (or 5/558 cases). Three were culture-positive cases, and two were culture-negative cases.<sup>2</sup>

The standard Mass. Eye and Ear protocol for eye trauma (i.e. surgical repair by a dedicated trauma team and 48 hours of intravenous antibiotics) is associated with post-traumatic endophthalmitis in fewer than one percent of cases. A review of the literature suggests that endophthalmitis rates around the world range from 2.6% to 17%. The United States National Eye Trauma Registry has reported an endophthalmitis rate of 6.9% after open-globe repair.<sup>2</sup>

Reference: <sup>2</sup>Andreoli CM, Andreoli MT, Kloek CE, Ahuero AE, Vavvas D, Durand ML. Low rate of endophthalmitis in a large series of open globe injuries. *Am J Ophthalmol* 2009; 147(4): 601-608.

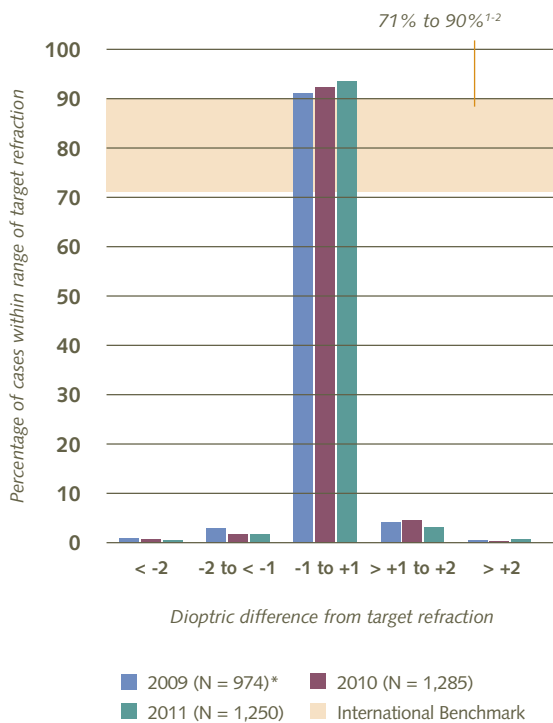
Endophthalmitis rates after eye trauma surgery performed at Mass. Eye and Ear are the lowest rates reported in the country. Based on the Mass. Eye and Ear experience and the low percentage of cases with endophthalmitis, we recommend that institutions adopt a standardized protocol for treating open-globe injuries and consider the use of prophylactic systemic antibiotics.<sup>2</sup>

## Cataract Surgery



The Comprehensive Ophthalmology and Cataract Consultation Service at Mass. Eye and Ear provides a full spectrum of integrated patient care, from annual eye exams and continued ophthalmology care, to subspecialty referrals. The most common surgery that we perform is cataract extraction with intraocular lens implantation.

### Cataract Surgery: Achieving Target Refraction (Spherical Equivalent)



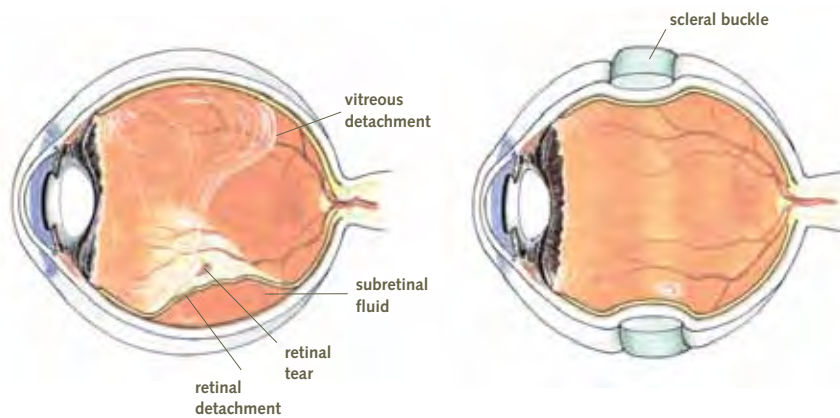
During the 2011 calendar year, the Comprehensive Ophthalmology and Cataract Consultation Service performed cataract surgery on 1,280 eyes at the Mass. Eye and Ear main Boston campus. This chart depicts the results of the 1,250 eyes that had at least one month of follow-up data. Ninety-four percent (1,180/1,250) of cataract patients achieved within one diopter of target refraction after cataract surgery. This is similar to the 2010 calendar year period, during which 1,369 cataract surgeries were performed; and of the 1,285 eyes with at least one month of follow-up data, 93.1% (1,196/1,285 eyes) achieved within one diopter of target refraction. During the July 2008 to June 2009 period, 1,109 cataract surgeries were performed; and of the 974 eyes with at least three months of follow-up data, 91.8% (894/974 eyes) achieved within one diopter of target refraction after cataract surgery.

Mass. Eye and Ear cataract surgery success rates continue to exceed international benchmarks.

\*July 2008-July 2009

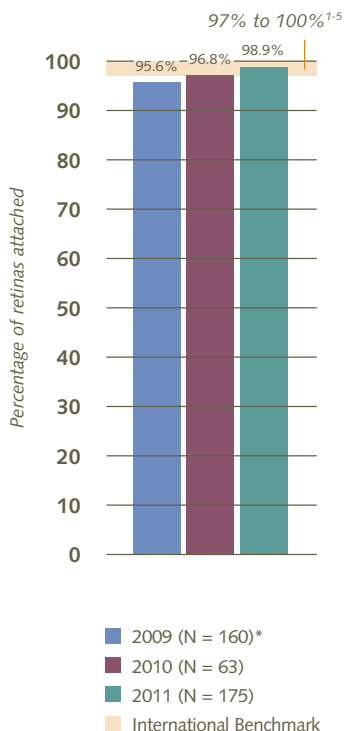
References: <sup>1</sup>Kugelberg M, Lundström M. Factors related to the degree of success in achieving target refraction in cataract surgery: Swedish National Cataract Register study. *J Cataract Refract Surg* 2008; 34(11): 1935-1939.  
<sup>2</sup>Cole Eye Institute. Outcomes 2010.

## Retinal Detachment and Retinal Detachment Repair



The Retina Service at Mass. Eye and Ear is one of the largest subspecialty groups of its kind in the country. Our clinicians are highly skilled at diagnosing and treating a full range of ocular diseases, including macular degeneration, diabetic retinopathy, retinal detachments, ocular tumors, intraocular infections, and severe ocular injuries.

### Retina Surgery: Retinal Reattachment Rate at Six Months for Primary Rhegmatogenous Retinal Detachment



Primary rhegmatogenous retinal detachment is one of the most common retinal conditions that require surgical repair by the Mass. Eye and Ear Retina Service. The number of retinal detachment repairs performed by the Mass. Eye and Ear Retina Service increased from 313 retinal detachment repairs on 248 patients in calendar year 2010 to 376 retinal detachment repairs on 312 patients in calendar year 2011. Between March 2008 and February 2009, primary rhegmatogenous retinal detachment was the most common retinal diagnosis (43.9% or 160/364) in surgery patients treated by the Retina Service.

Of the 179 rhegmatogenous retinal detachments during calendar year 2011, four were excluded due to lack of follow-up data after post-op week one. This left 175 eyes for analysis. Retinal reattachment was successfully achieved in 98.9% (173/175) of patients with a primary rhegmatogenous detachment during calendar year 2011; this success rate reflects patients who had one or more surgeries, which may have included pars plana vitrectomy, scleral buckle, and pneumatic retinopathy. These success rates are similar to calendar year 2010 results, where retinal reattachment was successfully achieved in 96.8% (61/63) of patients age 18 or older with a primary rhegmatogenous retinal detachment, and the results between March 2008 and February 2009, when retina surgeons were successful in reattaching the retina in 95.6% (153/160) of cases.

\*March 2008-February 2009

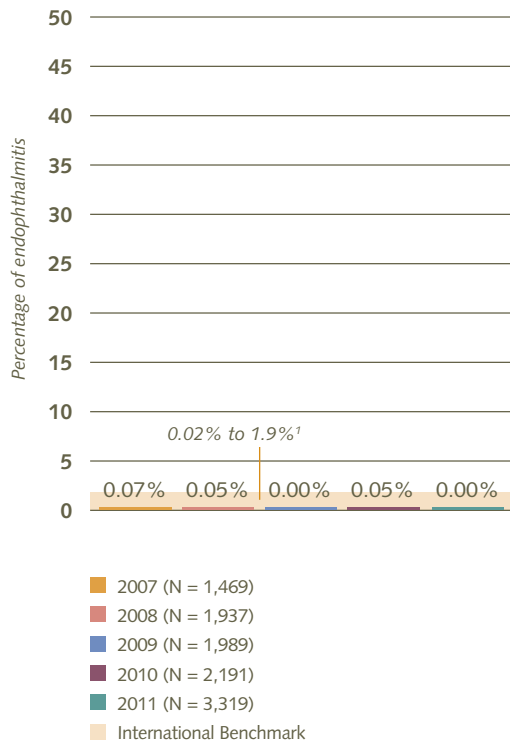
International benchmarks report success rates of rhegmatogenous retinal detachment repair after one or more surgeries ranging from 97% to 100%.<sup>1-5</sup>

This analysis includes only operations for primary rhegmatogenous retinal detachments. Exclusion criteria included retinal detachments that were non-rhegmatogenous, retinal detachments of unclear mechanism, rhegmatogenous retinal detachments in the setting of open-globe injuries, eyes with prior vitreoretinal surgery, and eyes with proliferative vitreoretinopathy.

With a 99% success rate for primary rhegmatogenous retinal detachment repair after one or more surgeries, Mass. Eye and Ear retina doctors have maintained high success rates for rhegmatogenous retinal detachment repair.

References: <sup>1</sup>Han DP, Mohsin NC, Guse CE, Hartz A, Tarkanian CN, Southeastern Wisconsin Pneumatic Retinopathy Study Group. Comparison of pneumatic retinopathy and scleral buckling in the management of primary rhegmatogenous retinal detachment. *Am J Ophthalmol* 1998; 126(5), 658-668. <sup>2</sup>Avitabile T, Bartolotta G, Torrisi B, Reibaldi A. A randomized prospective study of rhegmatogenous retinal detachment cases treated with cryopexy versus frequency-doubled nd:YAG laser-retinopexy during episcleral surgery. *Retina* 2004; 24(6), 878-882. <sup>3</sup>Azad RV, Chanana B, Sharma YR, Vohra R. Primary vitrectomy versus conventional retinal detachment surgery in phakic rhegmatogenous retinal detachment. *Acta Ophthalmol Scand* 2007; 85, 540-545. <sup>4</sup>Sullivan PM, Luff AJ, Aylward GW. Results of primary retinal reattachment surgery: a prospective audit. *Eye* 1997; 11, 869-871. <sup>5</sup>Day S, Grossman DS, Mruthyunjaya P, Sloan FA, Lee PP. One-year outcomes after retinal detachment surgery among Medicare beneficiaries. *Am J Ophthalmol* 2010; 150(3): 338-345.

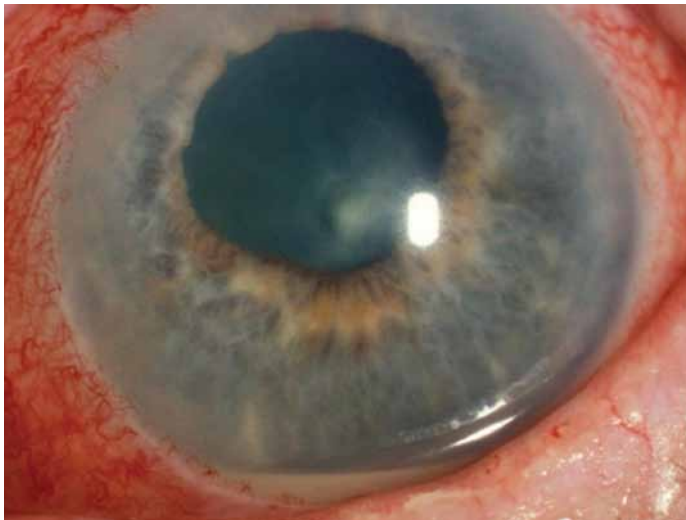
## Retina Surgery: Rates of Endophthalmitis after Intravitreal Injection



In order to identify cases of acute endophthalmitis, a retrospective review was performed of all consecutive eyes that underwent intravitreal injections from January 1, 2007 to December 31, 2011. During this five-year period, 10,905 intravitreal injections were performed. Of these injections, 3,319 took place during the 2011 calendar year, which had zero reported cases of endophthalmitis (0%).

Over a five-year period, the overall incidence rate of endophthalmitis subsequent to intravitreal injection was 0.028% (three of 10,905 injections). In one case of acute endophthalmitis, the patient presented three days after the injection. Bacterial cultures revealed coagulase-negative *Staphylococcus* species. Treatment of the infection resulted in a best-corrected visual acuity at 19 months follow-up of 20/25 (baseline 20/30). In the second case, the patient presented four days after the injection. Gram stain showed moderate bacteria, but cultures were negative. After treatment, best-corrected visual acuity at two years follow-up was 20/50-1 (baseline 20/32-2). In the third case, the patient presented with delayed onset endophthalmitis one month after the injection. Vitreous culture showed moderate *Staphylococcus epidermidis*, and an anterior chamber tap revealed no growth. After treatment, visual acuity with correction at seven months follow-up was 20/30+2 (baseline 20/25).

Reference: <sup>1</sup>Bhavsar et al. Risk of endophthalmitis after intravitreal drug injection when topical antibiotics are not required. *Arch Ophthalmol* 2009; 127(12): 1581-1583.



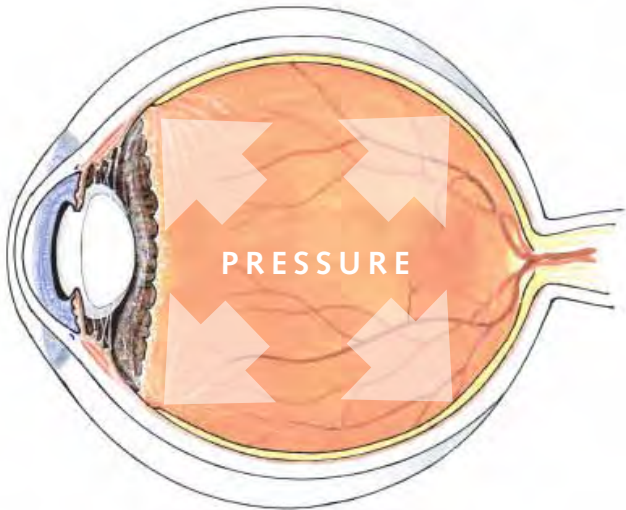
Acute endophthalmitis is a rare potential complication of intravitreal injections. The Mass. Eye and Ear intravitreal injection infection rate is one of the lowest reported rates compared to international benchmarks.

(left) Photograph of endophthalmitis

Photo courtesy of Lucy H. Young, M.D., Ph.D., F.A.C.S.

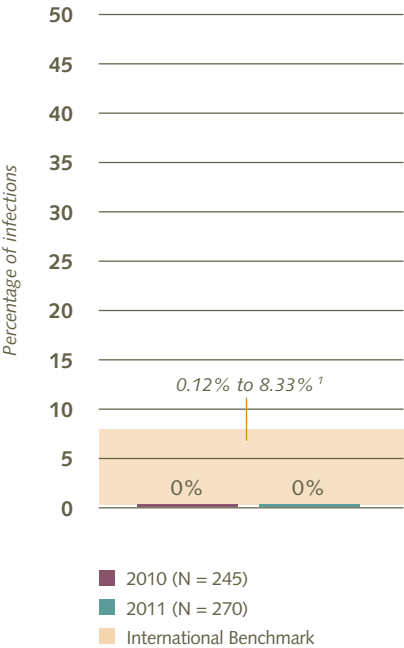


# Glaucoma Surgery



Glaucoma is a group of disorders in which the main risk factor is elevated eye pressure. All glaucoma disorders are characterized by vision loss caused by damage to the optic nerve, which provides the pathway from the eyeball to the brain. Members of the Mass. Eye and Ear Glaucoma Consultation Service are trained in the most advanced laser and surgical procedures to treat and mitigate the symptoms of glaucoma.

## Glaucoma Surgery: Trabeculectomy and Tube Shunt Infection Rates



The most common incisional surgeries performed by the Mass. Eye and Ear Glaucoma Consultation Service are trabeculectomy surgery and tube shunt surgery. Trabeculectomy surgery is the gold standard incisional surgery that is usually performed first in patients who require glaucoma surgery. The total number of trabeculectomy and tube shunt surgeries performed by the Glaucoma Consultation Service increased from 245 during calendar year 2010 to 270 during calendar year 2011.

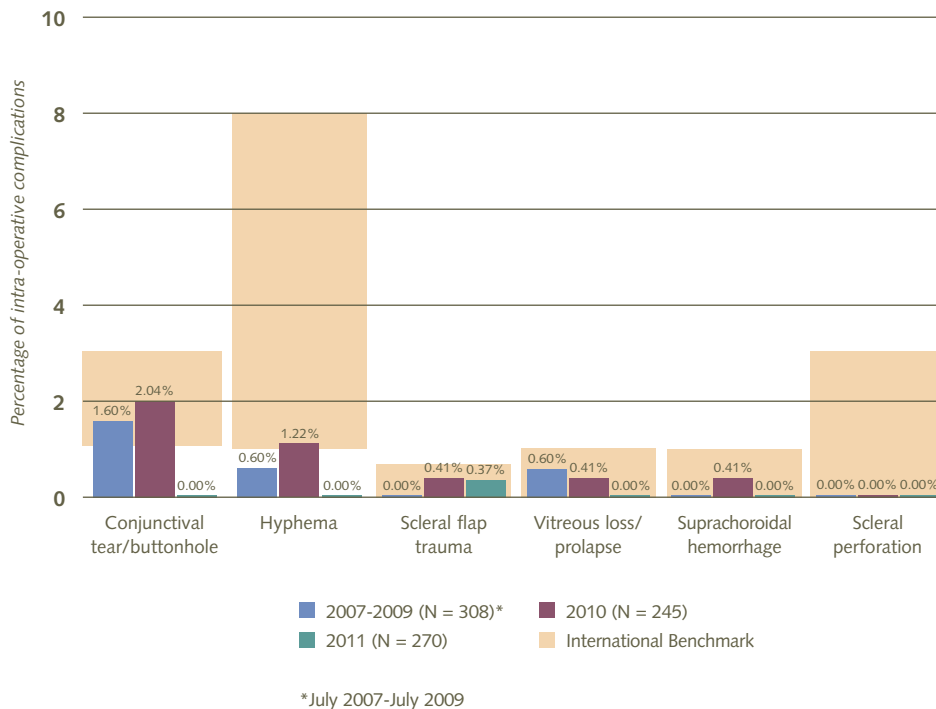
During the 2011 calendar year, the Glaucoma Consultation Service performed trabeculectomy surgery (with or without previous scarring) on 85 eyes and performed tube shunt surgeries (primary or revision) on 185 eyes. Zero cases of endophthalmitis were reported during this 12 month period. There were also no cases reported in calendar year 2010 when data collection began.

Complete success is defined as a zero percent infection rate per year. A review of the literature suggests that trabeculectomy and tube shunt infection rates range from 0.12% to 8.33%.<sup>1</sup>

Reference: <sup>1</sup>Ang GS, Varga Z, Shaarawy T. Postoperative infection in penetrating versus non-penetrating glaucoma surgery. *Br J Ophthalmol* 2010; 94(12): 1571-1576.

The Mass. Eye and Ear Glaucoma Consultation Service has one of the lowest trabeculectomy and tube shunt infection rates compared to international benchmarks.

## Trabeculectomy and Glaucoma Implant Surgery: Intra-Operative Complications



The Mass. Eye and Ear Glaucoma Consultation Service continues to maintain some of the lowest intra-operative complication rates compared to international benchmarks.

Of the 270 cases of trabeculectomy surgery or glaucoma implant surgery performed by the Glaucoma Consultation Service during the 2011 calendar year, 99.6% (269/270) of patients had no intra-operative complications. These results are better than calendar year 2010 results, where 95.5% (234/245) of trabeculectomy and tube surgeries had no intra-operative complications. These results are also similar to an earlier 24 month period between July 2007 and June 2009, where 97.1% (299/308) of eyes had no intra-operative complications from trabeculectomy or tube shunt surgery. These cases represented the 308 of 315 surgeries that had sufficient documentation to assess for intra-operative complications.

### The 270 cases evaluated included:

- 74 trabeculectomies without scarring
- 11 trabeculectomies with previous scarring
- 150 primary tube surgeries
- 35 tube revisions

### Mass. Eye and Ear 2011 complication rates:

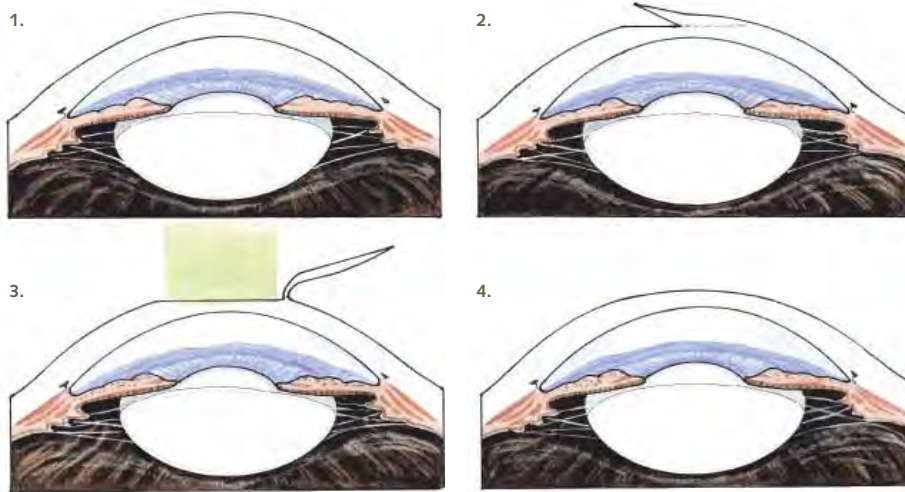
- Conjunctival tear/buttonhole: 0%
- Hyphema: 0%
- Scleral flap trauma: 0.37%
- Vitreous loss (vitreous prolapse): 0%
- Suprachoroidal hemorrhage: 0%
- Scleral perforation: 0%

### International benchmarks:<sup>1-4</sup>

- Conjunctival tear/buttonhole: 1.1% - 3%
- Hyphema: 1% - 8%
- Scleral flap trauma: 0.7%
- Vitreous loss (vitreous prolapse): 1%
- Suprachoroidal hemorrhage: 0% - 1%
- Scleral perforation: 0% - 3%

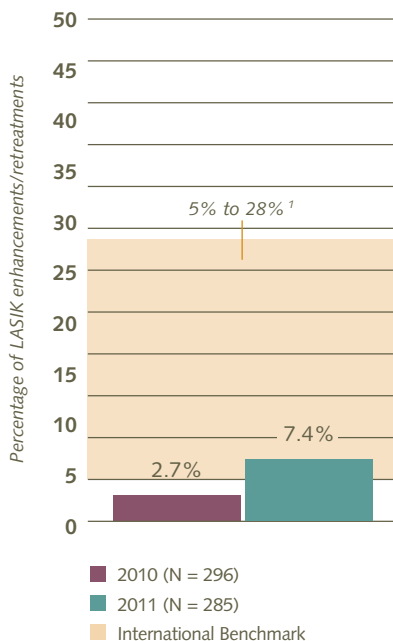
References: <sup>1</sup>Barton K, Gedde SJ, Budenz DL, Feuer WJ, Schiffman J. The Ahmed Baerveldt Comparison Study: methodology, baseline patient characteristics, and intraoperative complications. *Ophthalmology* 2011; 118(3): 435-442. <sup>2</sup>Jampel HD, Musch DC, Gillespie BW, Lichter PR, Wright MM, Guire KE. Perioperative complications of trabeculectomy in the Collaborative Initial Glaucoma Treatment Study (CIGTS). *Am J Ophthalmol* 2005; 140(1): 16-22. <sup>3</sup>Gedde SJ, Herndon LW, Brandt JD, Budenz DL, Feuer WJ, Schiffman JC. Surgical complications in the tube versus trabeculectomy study during the first year of follow-up. *Am J Ophthalmol* 2007; 143(1): 23-31. <sup>4</sup>Christakis PG, Tsai JC, Zurakowski D, Kalenak JW, Cantor LB, Ahmed IK. The Ahmed Versus Baerveldt Study: design, baseline patient characteristics, and intraoperative complications. *Ophthalmology* 2011; 118(11): 2172-2179.

## Refractive Surgery



Refractive surgery, commonly known as laser vision correction, is a term given to surgical procedures designed to correct certain visual problems such as myopia (nearsightedness), hyperopia (farsightedness), and astigmatism. The Mass. Eye and Ear Cornea and Refractive Surgery Service offers a number of refractive procedures, the most common of which are LASIK (laser-assisted in situ keratomileusis) and PRK (photorefractive keratectomy).

### Refractive Surgery LASIK: Enhancement/Retreatment Rates at Six Months Follow-up



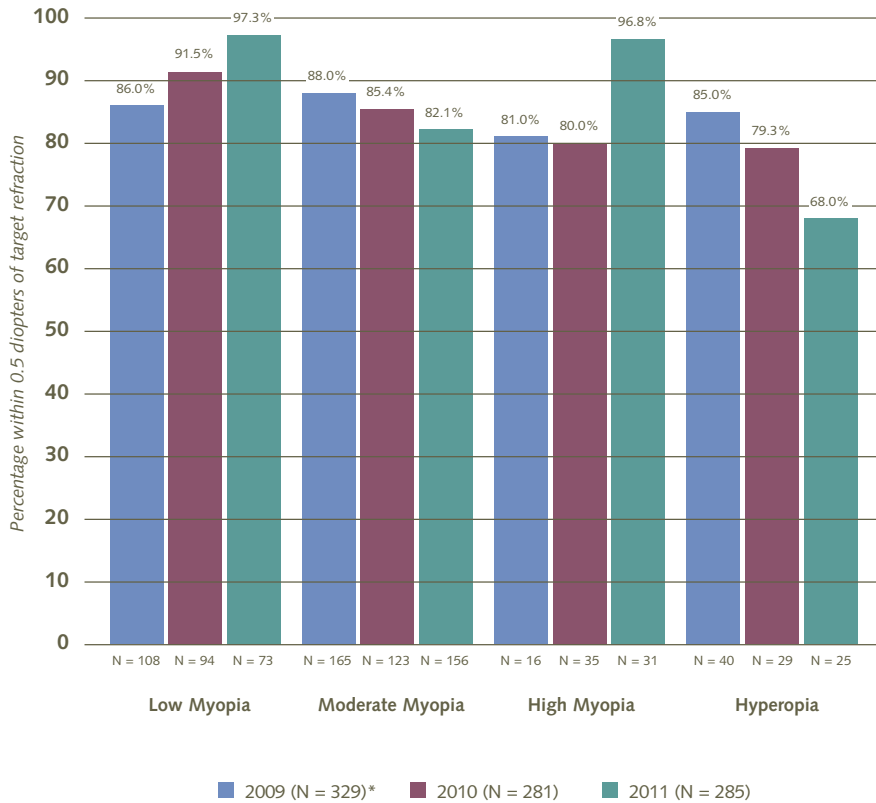
Of the 321 eyes that had LASIK (laser-assisted in situ keratomileusis) surgery during the 2011 calendar year, 285 had sufficient follow-up data for analysis. Of these 285 eyes, 7.4% (21/285) had an enhancement/retreatment procedure within six months. During the 2010 calendar year, only 2.7% (8/296) of eyes that had LASIK had an enhancement/retreatment procedure within six months. Prior to 2010, LASIK enhancement/retreatment rates were measured using three months follow-up data; the retreatment rates reported for the 2010 and 2011 calendar years reflect data collected at six months after surgery.

LASIK retreatment rates of between 5% and 28% have been reported in the literature.<sup>1</sup>

Reference: <sup>1</sup>Hersh PS, Fry KL, Bishop DS. Incidence and associations of retreatment after LASIK. *Ophthalmology* 2003; 110(4): 748-754.

The Mass. Eye and Ear Cornea and Refractive Surgery Service has some of the lowest enhancement/retreatment rates in the country.

## Refractive Surgery LASIK: Achieving Target Refraction (Spherical Equivalent)



\*July 2008-July 2009

During the 2011 calendar year, 285 of the 321 eyes that had LASIK (laser-assisted in situ keratomileusis) surgery had sufficient follow-up data for analysis. Sufficient follow-up was defined as at least one month of follow-up for myopia and three months follow-up for hyperopia. This is similar to 2010 calendar year data, where 281 of the 296 eyes that had LASIK surgery had sufficient follow-up data for analysis. These surgical numbers are slightly less than an earlier one year period between July 2008 and June 2009, where 329 eyes that had LASIK had sufficient follow-up for analysis.

In calendar year 2011, the overall LASIK success rate for achieving within 0.5 diopters of target refraction for both myopes and hyperopes was 86.3% (246/285 eyes). The success rate for all myopes was 88.1% (229/260 eyes) and for hyperopes was 68% (17/25 eyes). Compared to an overall success rate of 86.1% (242/281) for myopes and hyperopes in calendar year 2010 and 86.6% (285/329) between July 2008 and June 2009, the Mass. Eye and Ear Cornea and Refractive Surgery Service continued to maintain a high overall success rate of 86.3% for LASIK surgery in 2011.

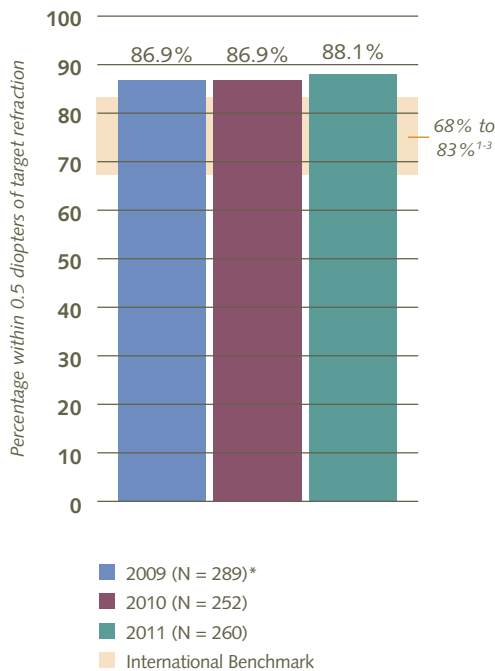
**Low Myopia**  
less than 3 diopters of sphere

**Moderate Myopia**  
3 to <7 diopters of sphere

**High Myopia**  
7 to 10 diopters of sphere

**Hyperopia**  
0 to 7 diopters of sphere

## Refractive Surgery LASIK for Myopia: Achieving Target Refraction (Spherical Equivalent)



\*July 2008-June 2009

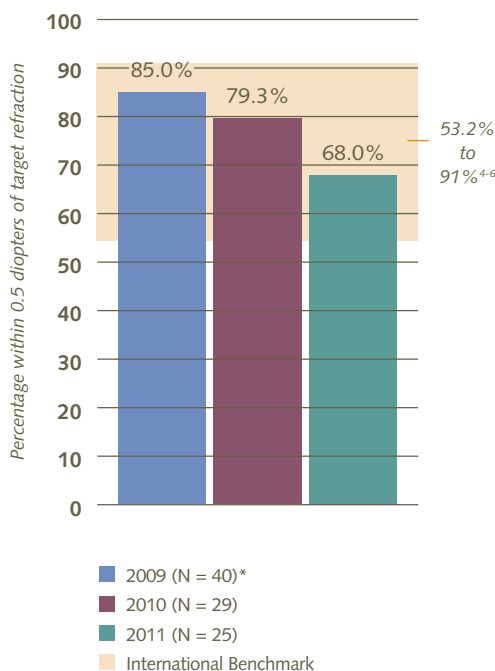
The LASIK (laser-assisted in situ keratomileusis) success rate for myopia at one month was 88.1% (229/260 eyes) for calendar year 2011. These 2011 calendar year results were similar to the success rates of 86.9% (219/252 eyes) for calendar year 2010 and 86.9% (251/289) for the 12 month period between July 2008 and June 2009. The Mass. Eye and Ear Cornea and Refractive Surgery Service continues to maintain high LASIK surgery success rates for myopia.

National benchmark data from FDA trials for LASIK for myopia showed that 71.6% of eyes resulted in a refractive error within  $\pm 0.5$  diopters of the intended target correction. Further review of the literature suggests that after LASIK surgery for myopia, approximately 68% to 83% of eyes achieve within  $\pm 0.5$  diopters of the intended target correction.<sup>1-3</sup>

Reference: <sup>1</sup>Bailey MD and Zadnick K. Outcomes of LASIK for myopia with FDA-approved lasers. *Cornea* 2007; 26(3), 246-254. <sup>2</sup>Yuen LH, Chan WK, Koh J, Mehta JS, Tan DT. A 10-year prospective audit of LASIK outcomes for myopia in 37,932 eyes at a single institution in Asia. *Ophthalmology* 2010; 117(6): 1236-1244. <sup>3</sup>Mrochen M, Kaemmerer M, Seiler T. Clinical results of wavefront-guided laser in situ keratomileusis 3 months after surgery. *J Cataract Refract Surg* 2001; 27(2): 201-207.

The Mass. Eye and Ear Cornea and Refractive Surgery Service continues to exceed international benchmarks for success rates after LASIK surgery for myopia.

## Refractive Surgery LASIK for Hyperopia: Achieving Target Refraction (Spherical Equivalent)



\*July 2008-June 2009

Of the 50 eyes that had LASIK surgery for hyperopia during the 2011 calendar year, 25 had three months or more of follow-up data for analysis. The overall 2011 LASIK success rate for achieving within 0.5 diopters of target refraction was 68% (17/25 eyes) for hyperopia. The Mass. Eye and Ear Cornea and Refractive Surgery Service's success rate in 2010 was 79.3% (23/29 eyes) for hyperopia and was 85% (34/40) between July 2008 and June 2009.

Reference: <sup>4</sup>Jaycock PD, O'Brart DPS, Rajan MS, Marshall J. 5-year follow-up of LASIK for hyperopia. *Ophthalmology* 2005; 112(2): 191-199. <sup>5</sup>Keir NJ, Simpson T, Hutchings N, Jones L, Fonn D. Outcomes of wavefront-guided laser in situ keratomileusis for hyperopia. *J Cataract Refract Surg* 2011; 37(5): 886-893. <sup>6</sup>Cole Eye Institute. Outcomes 2010.

A review of the literature suggests that the success rate for achieving within 0.5 diopters of the intended target correction after LASIK for hyperopia ranges between 53.2% and 91%.<sup>4-6</sup>

## Seeing the Outcomes of an Independent Life

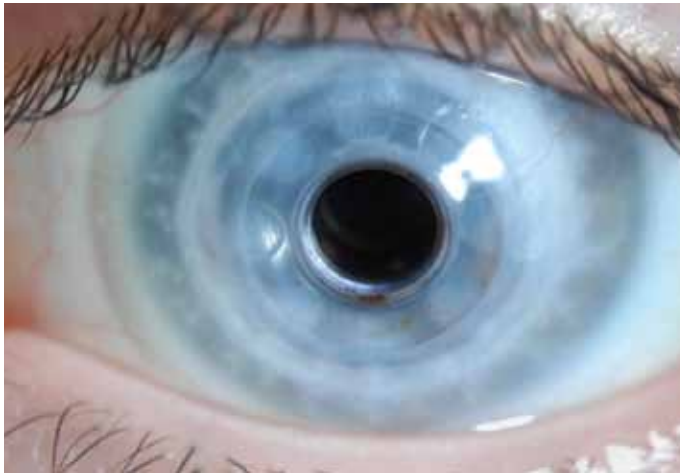


Mercy Muzumara was a young mother from Zambia caring for three children when she lost her sight. She developed severe scarring on her corneas following an adverse reaction to an antibiotic. Recently widowed, Mercy had difficulty taking care of herself and her children. She was forced to move in with relatives. Doctors in Zambia told Mercy there wasn't anything they could do to help her.

But there was help for Mercy at Mass. Eye and Ear, thanks to a device developed at the hospital: The Boston Keratoprosthesis (KPro) or artificial cornea. Mass. Eye and Ear's Dr. Claes Dohlman spent his career developing the technology. Cornea specialist Dr. James Chodosh implanted the Kpro that restored Mercy's sight. After surgery, Mercy travelled back home to Zambia, where she was able to see her children's faces for the first time in three years.

Mercy, artificial cornea patient

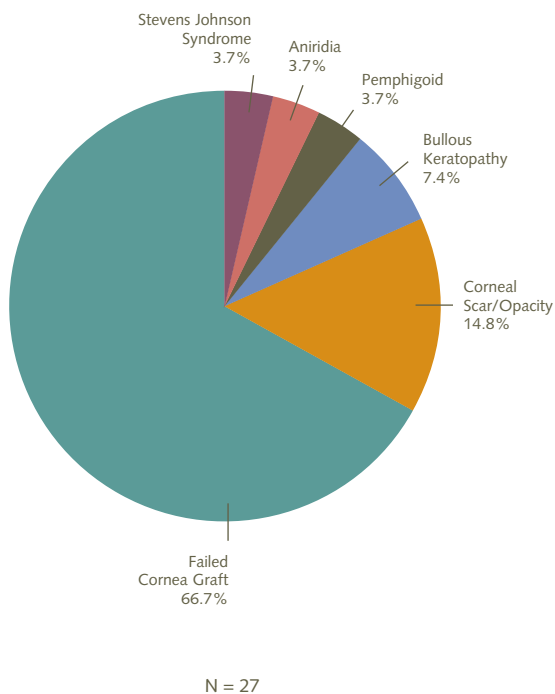
## Cornea Surgery



(left) Photograph of Keratoprosthesis (KPro)

Photo courtesy of  
Claes Dohlman, M.D., Ph.D.

## Keratoprosthesis (KPro) Surgery: Surgical Indications



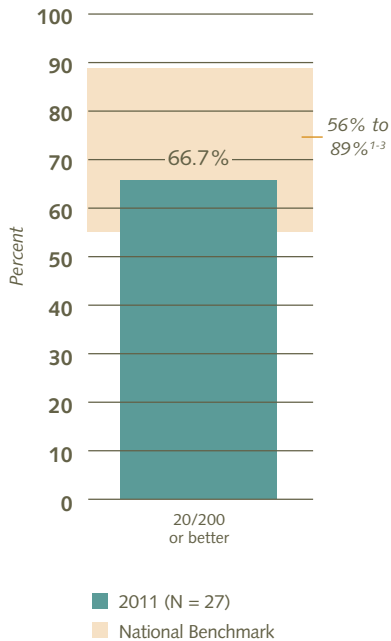
Thirty-three patients received the type 1 Boston Keratoprosthesis (KPro) during calendar year 2011, the first 12 month period for which surgical indications data was reported. Of these 33 patients, 28 (84.8%) received a keratoprosthesis for the first time. This analysis includes the 27 patients who underwent primary type 1 Boston KPro surgery and who had at least three months of follow-up data. Indications for KPro surgery included failed corneal grafts (18/27, 66.7%), corneal scar or opacity (4/27, 14.8%), bullous keratopathy (2/27, 7.4%), aniridia (1/27, 3.7%), Stevens Johnson Syndrome (1/27, 3.7%) and pemphigoid (1/27, 3.7%). The majority (19/27, 70.4%) of these patients had failed traditional corneal transplants in the past, but a few (8/27, 29.6%) received it as a primary procedure.

Reference: <sup>1</sup>Ament JD, Stryjewski TP, Ciolino JB, Todani A, Chodosh J, Dohlman CH. Cost-effectiveness of the Boston Keratoprosthesis. *Am J Ophthalmol* 2010; 149(2): 221-228.

The Boston KPro is an artificial cornea developed at Mass. Eye and Ear by Claes Dohlman, M.D., Ph.D., and colleagues. Dr. Dohlman is former Chief and Chair of the Department of Ophthalmology, and currently Emeritus Professor of Ophthalmology at Harvard Medical School.

In development since the 1960s, the KPro received FDA clearance in 1992. It is the most commonly used artificial cornea in the U.S. and the world, with more than 7,000 implantations to date. The KPro is reserved for patients blinded by corneal disease and for whom a standard corneal transplant is not a viable option.<sup>1</sup>

## Keratoprosthesis (KPro) Surgery: Visual Outcomes



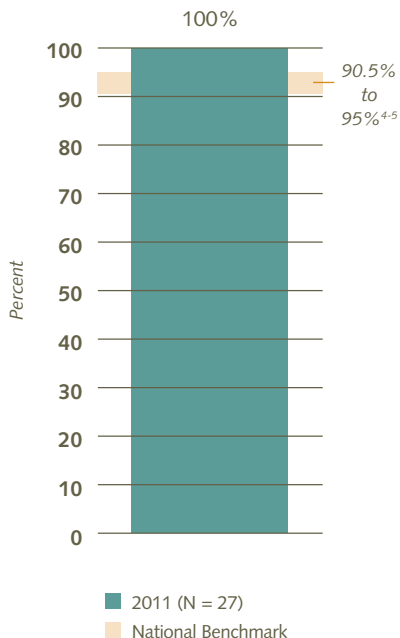
Of the 27 primary type 1 keratoprosthesis (KPro) surgeries for which three months of follow-up data were available for analysis, 18 (66.7%) achieved 20/200 vision or better at any point within the three month post-operative period or longer. This is comparable to national benchmarks of 56% to 89% reported in the literature.<sup>1-3</sup>

Of the nine patients who did not achieve a post-operative vision of 20/200 or better, eight patients had pre-existing severe retinal disease or advanced glaucoma, which limited visual prognosis. Only one of the nine patients had the potential to have 20/200 vision or better. This patient's vision was limited by a dense retroprosthetic membrane, which may be removed with laser treatment.

*References: <sup>1</sup>Kang JJ, de la Cruz J, Cortina MS. Visual outcomes of Boston keratoprosthesis implantation as the primary penetrating corneal procedure. Cornea 2012; 0(0): 1-5. <sup>2</sup>Zerbe BL, Berlin MW, Ciolino JB. Results from the multicenter Boston type I keratoprosthesis study. Ophthalmology 2006; 113(10): 1779.e1-1779.e7. <sup>3</sup>Greiner MA, Li JY, Mannis MJ. Longer-term vision outcomes and complications with the Boston type 1 keratoprosthesis at the University of California, Davis. Ophthalmology 2011; 118(8): 1543-1550.*

Prior to 2011, visual outcomes were reported for those patients who received primary type 1 KPro and had at least two years of follow-up data.

## Keratoprosthesis (KPro) Surgery: Retention Rates



Of the 27 primary type 1 Boston KPro surgeries for which three months of follow-up data were available, 100% of patients retained the KPro at three months, and none needed replacement. A review of the literature showed that 90.5% to 95% of patients retain their KPro at six months.<sup>4-5</sup>

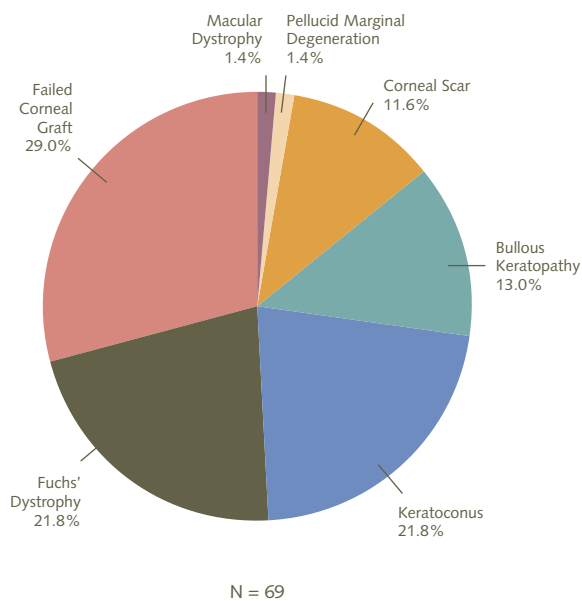
*References: <sup>4</sup>Kang JJ, de la Cruz J, Cortina MS. Visual outcomes of Boston keratoprosthesis implantation as the primary penetrating corneal procedure. Cornea 2012; 0(0): 1-5. <sup>5</sup>Zerbe BL, Berlin MW, Ciolino JB. Results from the multicenter Boston type I keratoprosthesis study. Ophthalmology 2006; 113(10): 1779.e1-1779.e7.*

Mass. Eye and Ear success rates exceed the national benchmarks for successful device retention following type 1 KPro surgery.

Calendar year 2011 was the first 12 month period for which retention rate data was reported.



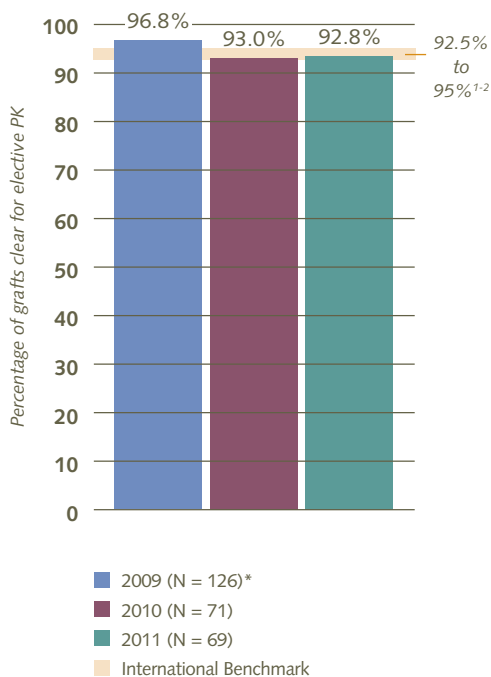
## Cornea Surgery: Surgical Indications for Penetrating Keratoplasty (PK)



The current analysis included only elective penetrating keratoplasties that were performed by the Mass. Eye and Ear Cornea and Refractive Surgery Service and had at least three months of follow-up data. Elective penetrating keratoplasties included first time grafts in uninflamed host beds as well as those performed in eyes at high risk of rejection. Diagnoses associated with elective penetrating keratoplasties included Fuchs' dystrophy (15/69, 21.8%), keratoconus (15/69, 21.8%), corneal scar (8/69, 11.6%), failed corneal graft (20/69, 29.0%), bullous keratopathy (9/69, 13.0%), macular dystrophy (1/69, 1.4%) and pellucid marginal degeneration (1/69, 1.4%). Patients were excluded who had non-elective penetrating keratoplasties, which were performed emergently for indications such as corneal perforation and severe microbial keratitis unresponsive to medical therapy. Also excluded were penetrating keratoplasties done in combination with retinal or glaucoma surgeries.

Cornea transplant surgery provides clear cornea tissue from a donor to replace diseased host tissue.

## Cornea Surgery: Clear Corneal Grafts after Penetrating Keratoplasty (PK) Surgery at Three Months Follow-up



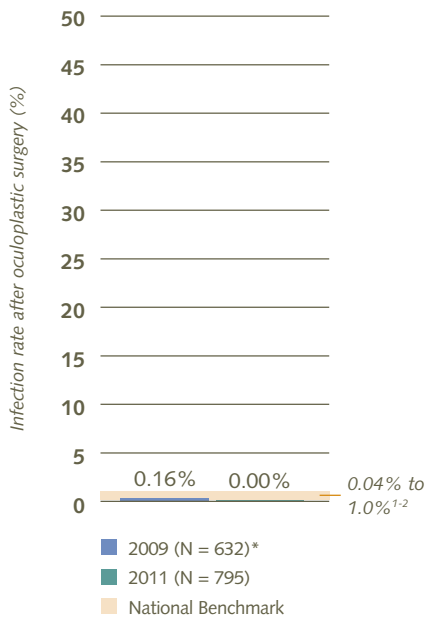
During the 2011 calendar year, 96 full thickness PKs were performed. Eight of 96 (8.3%) were performed in combination with complex retinal or glaucoma procedures; seven of 96 (7.3%) did not have sufficient three month follow-up data. Of the 81 PKs for which three months follow-up data was available for analysis, 69 (85.2%) were elective and 12 (14.8%) were non-elective. Sixty-four of the 69 elective PKs (92.8%) performed during the calendar year 2011 achieved surgical success, which is defined as a graft at three months follow-up with minimal (to no) clinical edema and which possesses clarity sufficient to permit the examiner to have an unencumbered view of the interior of the eye including iris details. Mass. Eye and Ear success rates are comparable to the international benchmark rates reported in the literature.<sup>1-2</sup> In addition, during the calendar year 2010, 66 of 71 (93.0%) elective PKs achieved surgical success; and from July 2008 to July 2009, 122 of 126 (96.8%) eyes achieved surgical success.

The number of full-thickness penetrating keratoplasties (PKs) performed by the Cornea and Refractive Surgery Service at Mass. Eye and Ear was 112 in calendar year 2010, and 96 in calendar year 2011.

Reference: <sup>1</sup>Vail A, Gore SM, Bradley BA, Easty DL, Rogers CA. Corneal graft survival and visual outcome: a multicenter study. *Ophthalmology* 1994; 101(1), 120-127. <sup>2</sup>Price MO, Thompson Jr. RW, Price Jr. FW. Risk factors for various causes of failure in initial corneal grafts. *Arch Ophthalmol* 2003; 121(8): 1087-1092.

\*July 2008-June 2009

## Oculoplastic Surgery: Incidence of Post-Operative Infection at Six Months Follow-up



\*March 2008-February 2009

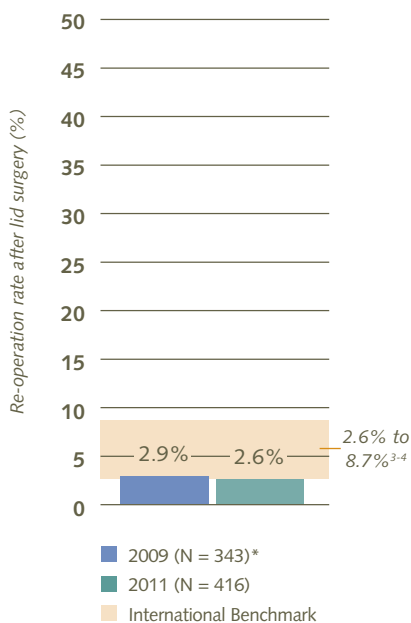
The incidence of post-operative infections following surgeries performed by the Mass. Eye and Ear Ophthalmic Plastic and Reconstructive Surgery Service is rare. Full-time staff performed 795 surgeries during the 2011 calendar year, and no patients developed a post-operative infection. Data collected from the twelve month period of March 2008 to February 2009 revealed a post-operative infection rate of only 0.16% (1/632). One patient developed MRSA (Methicillin-resistant Staphylococcus aureus) cellulitis following resection of an orbital tumor. The infection was successfully treated without permanent ocular sequelae.

A review of the literature suggests that infection rates after oculoplastic surgery range from 0.04% to 1.0%.<sup>1-2</sup>

Reference: <sup>1</sup>Lee EW, Holtebeck AC, Harrison AR. Infection rates in outpatient eyelid surgery. *Ophthal Plast Reconstr Surg* 2009; 25(2): 109-110. <sup>2</sup>Carter SR, Stewart JM, Khan J, Archer KF, Holds JB, Seiff SR, Dailey RA. Infection after blepharoplasty with and without carbon dioxide laser resurfacing. *Ophthalmology* 2003; 110(7): 1430-1432.

The Mass. Eye and Ear Ophthalmic Plastic and Reconstructive Surgery Service has one of the lowest infection rates when compared to national benchmarks.

## Oculoplastic Surgery: Re-Operation Rate for Lid Surgeries at Six Months Follow-up



\*March 2008-February 2009

During the 2011 calendar year, the Mass. Eye and Ear Ophthalmic Plastic and Reconstructive Surgery Service performed eyelid surgeries on 416 eyelids in 235 patients. Only 2.6% (11/416) of the eyelids required a second procedure within six months in order to achieve surgical success. These results are consistent with the 2.9% (10/343) of eyelids that required a lid re-operation after having had surgery during the March 2008 to February 2009 period. Re-operations involving eyelid retraction from thyroid eyelid disease were excluded from the analysis.

International benchmarks suggest that re-operation rates after lid surgery range from 2.6% to 8.7%.<sup>3-4</sup>

Reference: <sup>3</sup>Scoppettuolo E, Chadha V, Bunce C, Oliver JM, Wright M. *British Oculoplastic Surgery Society (BOPSS) National Ptosis Survey*. *Br J Ophthalmol* 2008; 92(8): 1134-1138. <sup>4</sup>Melicher J, Nerad JA. Ptosis surgery failure and reoperation. In: Cohen AJ, Weinberg DA, eds. *Evaluation and management of blepharoptosis*. New York: Springer; 2011: 269-274.

The Mass. Eye and Ear Ophthalmic Plastic and Reconstructive Surgery Service continues to have one of the lowest re-operation rates for lid surgeries compared to international benchmarks.

OTOLARYNGOLOGY DEPARTMENT

The Department of Otolaryngology at Mass. Eye and Ear has a long tradition in delivering excellence in clinical care, research and teaching. We provide comprehensive medical and surgical care in a variety of specialties in the field of otolaryngology, including: general otolaryngology, otology and neurotology, otoneurology, head and neck surgical oncology, laryngology, rhinology and sinus disease, pediatric otolaryngology, facial plastic and reconstructive surgery, facial nerve disorders, dermatology, laser reconstructive surgery, thyroid and parathyroid surgery.

We are also a center of research in these areas of expertise, with a long history of medical breakthroughs, including the discovery of stem cells in the adult inner ear, and the ability to screen infants at birth for deafness. Our physicians and scientists are committed to advancing the care provided to our patients.

MASS. EYE AND EAR DEPARTMENT OF OTOLARYNGOLOGY

- Primary teaching hospital and coordinating center for Harvard Medical School's Combined Residency Program in Otolaryngology – Head and Neck Surgery.
- Home to the Eaton-Peabody Laboratories of Auditory Physiology, Jenks Vestibular Physiology Laboratory, Jenks Vestibular Diagnostic Laboratory, Amelia Peabody Otoimmunochemistry Laboratory, Otopathology Laboratory, Norman Knight Center for Hyperbaric Medicine, Cochlear Implant Research Laboratory, National Temporal Bone, Hearing and Balance Pathology Resource Registry, Facial Nerve Center, Carolyn and Peter Lynch Center for Laser and Reconstructive Surgery, and the Tillotson Cell Biology Unit.

### Clinical Affiliations

- Massachusetts General Hospital (MGH)
  - Mass. Eye and Ear physicians and audiologists provide comprehensive and subspecialty care, including consultations and coordination of inpatient consultations for urgent patient care concerns and newborn infant auditory screening.
- Brigham and Women's Hospital (BWH)
  - Mass. Eye and Ear provides otology/neurotology subspecialty support to the Otolaryngology Division of BWH.
- Massachusetts Eye and Ear, Braintree; Massachusetts Eye and Ear, Concord; Massachusetts Eye and Ear, Duxbury; Massachusetts Eye and Ear, Newton; Massachusetts Eye and Ear, Stoneham; Massachusetts Eye and Ear, Quincy; Massachusetts Eye and Ear, Weymouth.
  - Mass. Eye and Ear physicians and audiologists provide comprehensive care throughout the Greater Boston area.
- Braintree Rehabilitation Hospital Unit of the Mass. Eye and Ear Balance and Vestibular Center
  - Mass. Eye and Ear specialists provide comprehensive vestibular diagnostic services, and otologic and neurologic assessment and care in a specialty clinic housed at the Braintree Rehabilitation Hospital.

### Otolaryngology Resources at Mass. Eye and Ear

- Full spectrum of primary and subspecialty otolaryngology care.
- Highly skilled clinical teams staff each area.
- Emergency Department open 24/7 for otolaryngology emergencies.
- Audiology Department providing a full range of diagnostic and treatment services, including newborn infant screening, audiometry, evoked response testing, electrocochleography and electroneuronography, hearing aid services, and cochlear implant and auditory rehabilitation services for adults and children.
- The Laryngology Division cares for patients suffering from laryngeal cancer, laryngeal motion disorders, hoarseness, papillomatosis and keratosis, and airway and voice disorders. They work closely with speech language pathologists in the

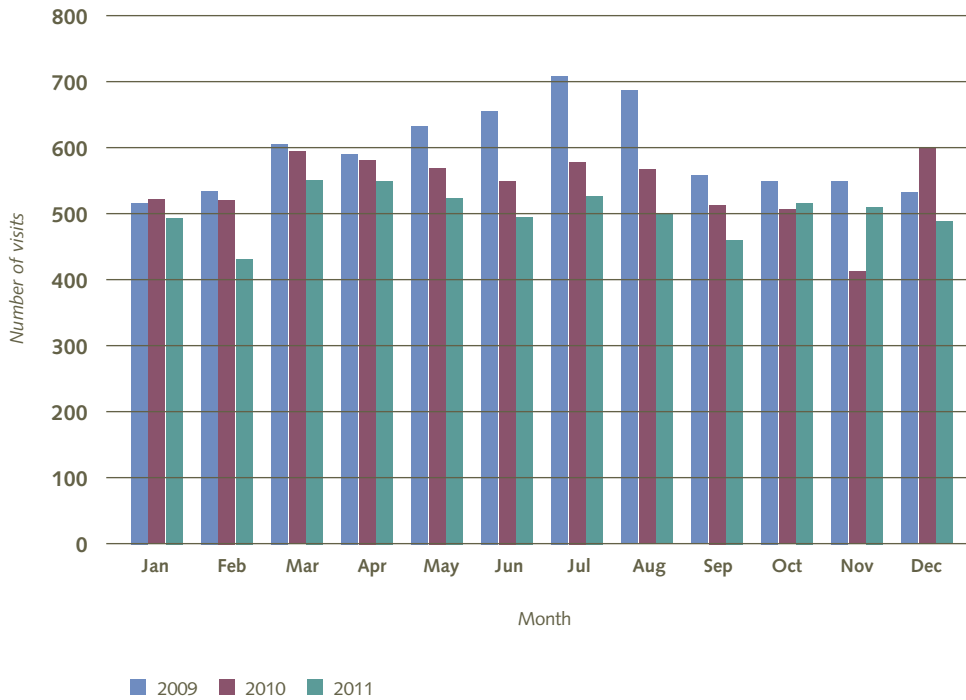
### Academic Affiliations

- Massachusetts General Hospital
- Brigham and Women's Hospital
- Beth Israel Deaconess Medical Center
- Boston Children's Hospital

Mass. Eye and Ear Voice and Speech Laboratory, which provides state-of-the-art audio and video diagnostic facilities, technicians, and therapists.

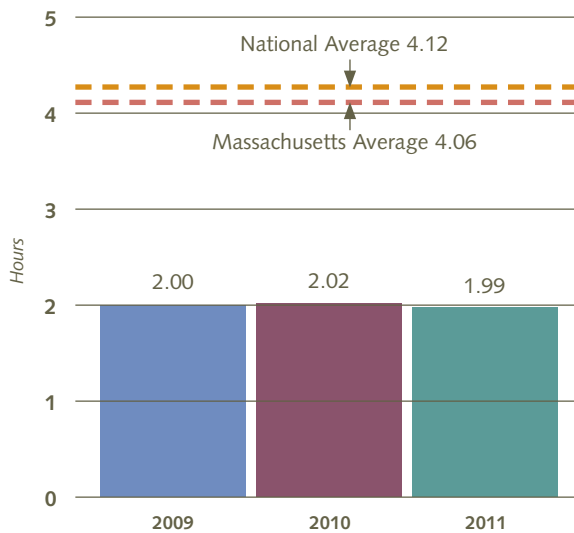
- Mohs Cutaneous Surgery Unit and Carolyn and Peter Lynch Center for Laser and Reconstructive Surgery provide care for a wide array of dermatologic disorders and cancer.
- Jenks Vestibular Diagnostic Laboratory offers the latest equipment and highly trained staff to aid in diagnosis of vestibular and balance disorders.
- Head and Neck Cancer Center provides the most up-to-date and effective evaluation and treatment modalities for patients with head and neck cancer, including microvascular surgery, and collaboration with MGH radiation oncology and proton beam facilities.
- Thyroid and Parathyroid Surgical Division offers diagnostic and surgical care for patients with endocrine diseases of the head and neck, with world-renowned expertise in nerve preservation and electrophysiological intraoperative monitoring in thyroid/parathyroid surgery.
- Facial Nerve Center offers full diagnostic, surgical, and rehabilitative services for patients with facial paralysis and movement disorders.
- Sinus Center provides clinical care to patients with all diseases of the nose and sinuses.
- Pediatric Airway, Voice and Swallowing Center performs assessments and treats a wide spectrum of congenital, developmental, and acquired disorders in children.
- Sleep Center provides polysomnography sleep diagnostic studies for assessment of adults and children with sleep disturbances.
- Clinical Vestibular and Balance Center offers full service multidisciplinary evaluation and treatment of patients with dizziness, vestibular and balance disorders.
- Fully integrated access to all hospital support services and infrastructure, including Social Work and Discharge Planning, Howe Library, Clinical and Research IT, Medical Unit, Infectious Disease Unit, Radiology Unit, Child Life specialists, Surgical Pathology Unit, International Program and language translation support, Dietary, and Pharmacy.

## Emergency Department: Otolaryngology Emergency Visits



This bar graph shows the number of otolaryngology patients seen monthly in the Mass. Eye and Ear Emergency Department during the 2009, 2010 and 2011 calendar years. During this three-year period, the Emergency Department maintained a high volume of otolaryngology emergency visits, with an average of 591 patients per month in 2009, 542 in 2010, and 502 in 2011.

## Emergency Department: Otolaryngology Visit Times

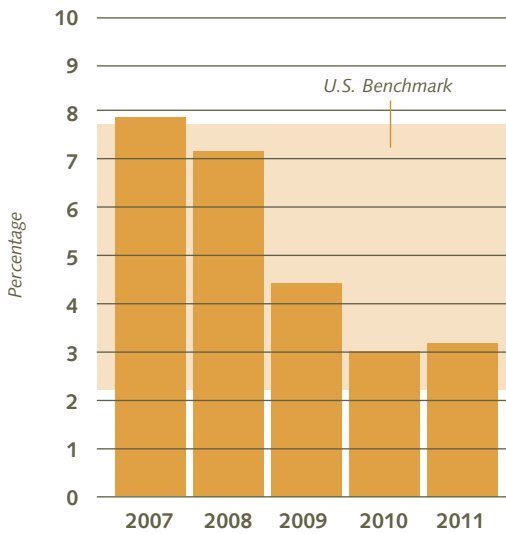


The average otolaryngology visit time in the Mass. Eye and Ear Emergency Department for 2011 was 1.99 hours. The 2011 average visit time was similar to 2009 and 2010 visit times, which were 2.00 and 2.02 hours, respectively. The average visit time is defined as the total time from when a patient walked in the door at the Mass. Eye and Ear Emergency Department to when the patient walked out the door after having seen the otolaryngologist. According to the 2010 Press Ganey Emergency Department Pulse Report, patients in the United States spent an average of four hours and seven minutes (4.12 hours) in the Emergency Department. The Massachusetts state average visit time was 4.06 hours.

For the past three years, the average otolaryngology visit time in the Mass. Eye and Ear Emergency Department was half the average national and state visit times.

The Pediatric Otolaryngology Division is dedicated to delivering specialized, compassionate care in the treatment of pediatric patients suffering from ear, nose, and throat conditions. These conditions vary from routine to complex, including ear and sinus infections, obstructive or infectious problems of the tonsils and adenoid, malformations or tumors of the head and neck, hearing and language disorders, and breathing and voice problems.

**Pediatric Otolaryngology:  
Tonsillectomy with or without Adenoidectomy  
Returned for Evaluation of Possible Post-Operative Bleeding**

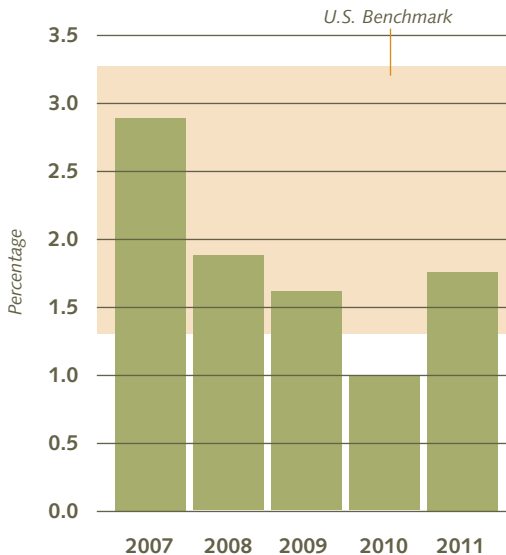


In 2011, full-time surgeons in the Division performed 495 tonsillectomies with or without adenoidectomy. Of those patients, 3.2 percent returned to the Mass. Eye and Ear Infirmary Otolaryngology Emergency Department for evaluation for possible post-operative bleeding, and 1.8 percent of patients were taken back to the operating room for additional repair.

These percentages for the graph to the left represent children undergoing tonsillectomy or tonsillectomy and adenoidectomy who then needed to return to the Emergency Department for evaluation for possible post-operative bleeding.

Post-operative bleeding after tonsillectomy or tonsillectomy and adenoidectomy is a common complication of this surgery. Anytime a parent suspects post-operative bleeding, they are encouraged to return their child to the ED for evaluation. Mass. Eye and Ear reports a rate of return to the ED for possible bleeding that is well below the national average.

**Pediatric Otolaryngology:  
Tonsillectomy with or without Adenoidectomy  
Returned and Admitted for Post-Operative Bleeding**



These percentages for the graph to the left represent children undergoing tonsillectomy or tonsillectomy and adenoidectomy who then developed tonsil bleeding severe enough to require a return to the operating room for surgical treatment.

*Reference: Collected by Christopher J. Hartnick, M.D., and clinical staff, 2011-2012. (unpublished)*

Mass. Eye and Ear reports a rate of returns to the operating room for surgical intervention of post-operative bleeding after surgery that is better than the national average.

## Pediatric Otolaryngology: Laryngeal Cleft

Between 2005 and 2012, over one thousand patients were seen for pulmonary aspiration, a condition in which a miscommunication between the gastrointestinal tract and the voice box causes food or liquid to become trapped in the lungs, sometimes leading to pneumonia. Of these patients, 42 were diagnosed with type 1 laryngeal cleft, a defect at the very top of the child's airway.

Table 1 shows that 15 of those patients were managed conservatively, by thickening their food so that it stays in the gastrointestinal tract, while 27 of those patients underwent endoscopic repair of their cleft. Table 2 shows that 21 of those patients who underwent surgery achieved successful outcomes for the repaired cleft. We found that the reason the six remaining patients' surgeries were unsuccessful was because of major co-morbidities that precluded success through surgical repair.

**Table 1**  
**Laryngeal Cleft Treatment**

---

Total patients diagnosed with type 1 laryngeal cleft.....	42
Patients conservatively managed by thickening food and drink.....	15
Patients who underwent endoscopic repair of the cleft.....	27

**Table 2**  
**Laryngeal Cleft Surgical Outcomes**

---

Total patients who underwent surgery for type 1 laryngeal cleft.....	27
Patients whose surgery was successful.....	21
Patients whose surgery was unsuccessful due to co-morbidities.....	6

Reference: Collected by Christopher J. Hartnick, M.D., and clinical staff, 2011-2012. (unpublished)

Pulmonary aspiration is a condition in which either saliva or liquid or solid food contents inadvertently go down the air pipe, instead of the food pipe. This can happen for several reasons, including drinking or eating too quickly, or having poor neuromuscular tone. It is very important to be sure that children do not have an actual connection between their airway and gastrointestinal tract. This connection is usually because of laryngeal cleft. Laryngeal clefts often require surgical repair, to avoid recurrent pneumonia or the development of chronic lung disease.



## Hearing the World from All Directions



Elle had just come into this world when she failed a routine newborn hearing screening. Her parents learned that she had profound hearing loss after she underwent extensive testing at Mass. Eye and Ear. Dr. Daniel Lee and the Audiology team sprang into action immediately to develop a plan to help Elle hear. Her parents and the team decided that bilateral cochlear implants were Elle's best option. Elle's surgery went well and her implants were activated two days before she turned one.

"Because of having her implanted so young, she has already caught up and is age appropriate with her language – actually, she's ahead of her typical hearing peers," Elle's mom says. "It's really funny because everyone says 'What, she has cochlear implants? She talks so much!' She's a confident and happy little girl."

Elle, bilateral cochlear  
implant patient

## Otology: Cochlear Implant Outcomes

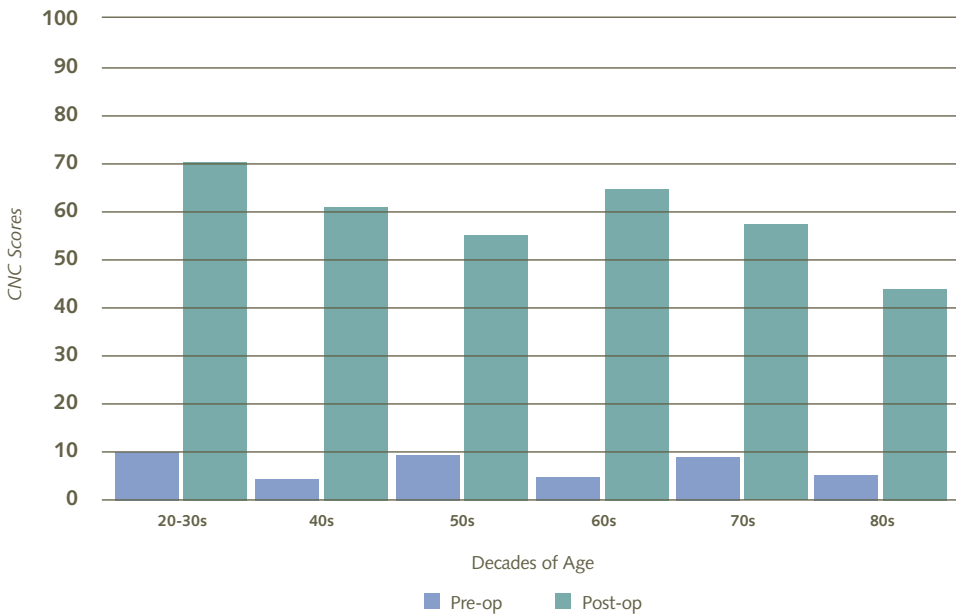
We reviewed the outcomes from adults who underwent cochlear implant (CI) surgery at the Mass. Eye and Ear between 2005 and 2010. All implant recipients included in this analysis initially presented with post-lingual hearing loss and received post-implant speech perception testing more than five months after surgery. Single syllable word testing (consonant-nucleus-consonant or CNC test) is used before and after CI surgery to assess word intelligibility. Our data demonstrates improvement following implantation in adults of all ages with severe-to-profound acquired deafness. There were no permanent facial nerve injuries or cases of meningitis associated with cochlear implant surgery performed by full-time faculty at the Mass. Eye and Ear.

	N	%
Delayed facial nerve paresis (resolved)	2/113	1.7
Permanent facial nerve injury	0/113	0

*Roberts, D.S., Lin, H.W., Herrmann B.S., and Lee D.J. Differential cochlear implant outcomes in older adults. Triological Society Meeting, COSM 2012.*

After surgery, cochlear implant patients report the following benefits: 1) improved oral communication at home and at work, 2) improved telephone use in the majority of patients, and 3) an overall improved quality of life.

## Otology: Cochlear Implant Outcomes



*Roberts, D.S., Lin, H.W., Herrmann B.S., and Lee D.J. Differential cochlear implant outcomes in older adults. Triological Society Meeting, COSM 2012.*

The consonant-nucleus-consonant (CNC) test is used before and after implantation to assess word intelligibility. During a CNC test, an audiologist measures the patient's ability to recognize a series of three-letter words such as "hat" and "car." The higher post-op scores shown in the graph to the left represent an improved speech perception in cochlear implant patients at Mass. Eye and Ear after surgery.

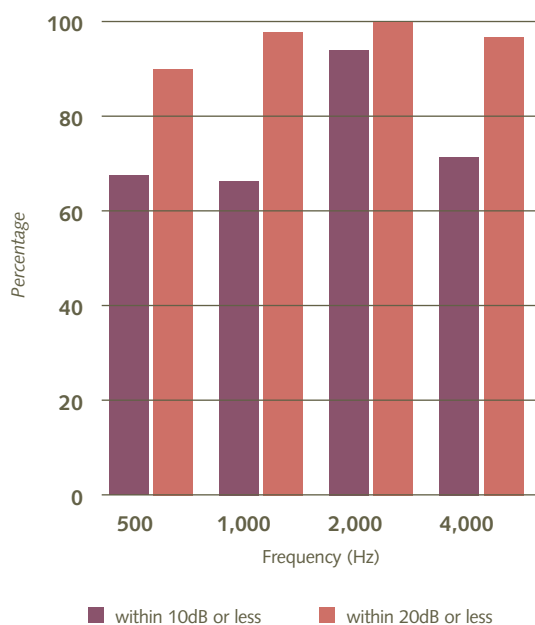
## Otology: Stapedectomy Outcomes

There are three ossicles (hearing bones) in the middle ear that vibrate in response to sound. In patients who suffer from otosclerosis, an abnormal, microscopic growth of bone in the walls of the inner ear causes the third ossicle, called the stapes (or “stirrup”) to be fixed or frozen in place. Normally, the stapes moves freely to allow the transmission of sound into the inner ear, but in otosclerosis the stapes cannot vibrate, resulting in hearing loss. These patients will often report difficulty with conversational speech at normal speaking levels while speaking to family or friends that becomes worse in social settings.

Stapedectomy surgery involves the removal of the diseased stapes bone using a specialized laser and replacement with an implant to restore hearing. Outcomes are measured by comparing the “air-bone gap” seen on hearing testing before and after surgery. The air-bone gap is the difference between nerve sensitivity (hearing potential) and what the patient actually hears. In patients with otosclerosis, sound vibrations are blocked by the immobile stapes bone, resulting in a large air-bone gap. The goal of surgery is to improve sound conduction for the patient, closing the air-bone gap. The better the reconstruction, the smaller the air-bone gap seen after surgery.

### Closure of Pre-operative Air-Bone Gap

Figure 1 shows the percentages of those 79 patients with closure of the pre-operative air-bone gap to within 10dB or less and to within 20dB or less.



A patient with hearing thresholds of better than 20 decibels (dB) will report significant improvements in communication. In 2011, 79 patients underwent primary stapedectomy surgery. Of those 79 patients, 99% showed closure of the pre-operative air-bone gap to within 20dB or better.

*Reference: Collected by Daniel J. Lee, M.D., F.A.C.S., and clinical staff, 2011-2012. (unpublished)*

Stapedectomy is a surgical intervention for patients who suffer from otosclerosis, with the goal of closing the air-bone gap, to improve the ear's conduction of sound.

Every patient showed hearing improvement and there were no dead ears following primary stapedectomy surgery.

## General Otolaryngology: Sinusitis Outcomes Study

Sinusitis is the symptomatic inflammation of the paranasal sinuses, and since it almost always involves the lining of the nose as well, it is frequently referred to as rhinosinusitis. Most commonly, rhinosinusitis is caused by an upper respiratory viral infection that leads to symptomatic blockage of the normal drainage pathway of the nose and sinuses. While simple viral infections frequently resolve on their own without intervention, sometimes a secondary bacterial infection occurs which may require treatment with antibiotics. An important new study of sinusitis outcomes is being conducted at Mass. Eye and Ear by Drs. Ralph Metson, Stacey Gray, Eric Holbrook and Aaron Remenschneider.

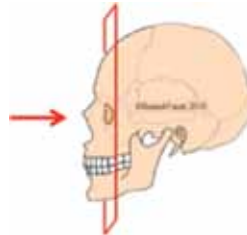
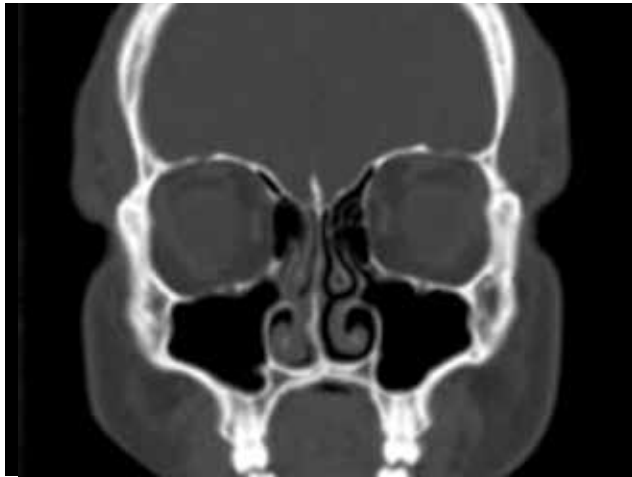
Patients who suffer from sinusitis typically complain of nasal obstruction, facial pain, decreased sense of smell and thick nasal discharge. Treatment consists of nasal decongestion, saline nasal irrigation and often a course of antibiotics. Treatment for chronic rhinosinusitis includes topical nasal therapy, oral medications as needed and sometimes, surgery.

When symptoms are persistent or a complication of sinusitis is suspected, a CT scan is often required to evaluate a patient's sinonasal anatomy. Inflammation that blocks the normal drainage tracts in the nose may require surgical intervention to create a more effective drainage pathway. A normal CT scan will show air filled sinuses and patent sinus openings (Figure 1).

### Common symptoms of sinusitis:

- nasal obstruction
- facial pain
- decreased sense of smell
- thick nasal discharge

Figure 1. Normal Sinuses as seen on Coronal CT Scan



A normal CT scan, shown to the left, shows air filled sinuses and patent sinus openings.

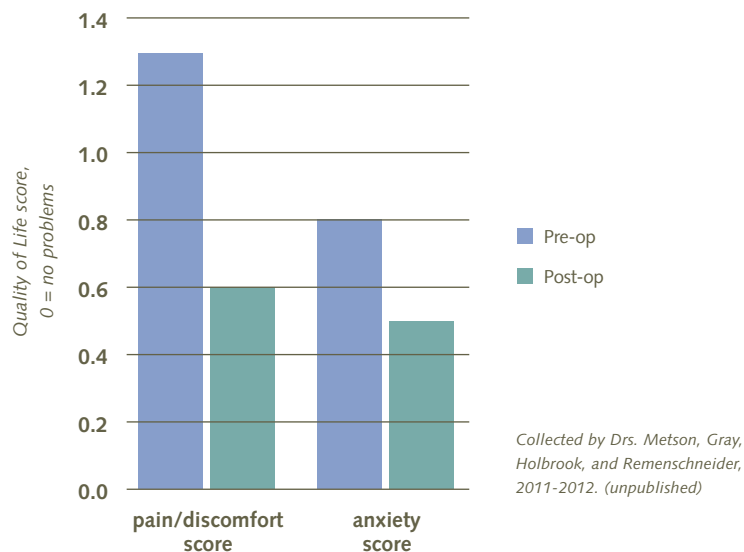
In a patient with chronic sinusitis and obstructed nasal drainage tracts, CT scans are helpful for targeted therapy and preoperative planning, should surgery be necessary (Figure 2).

Figure 2. Sinusitis as seen on Coronal CT Scan



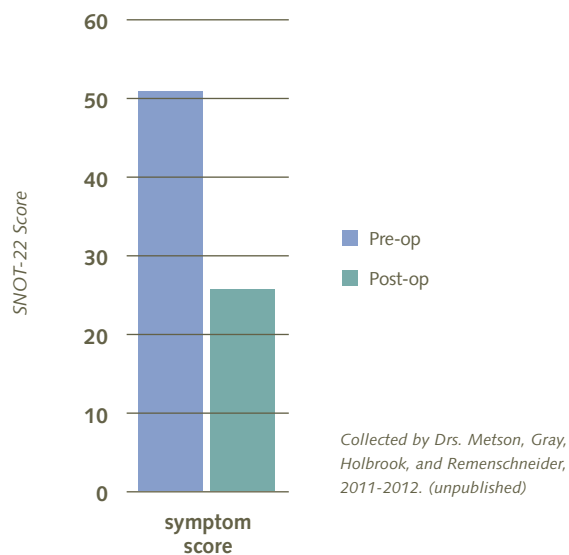
Three month post-operative results show improvements in pain and anxiety scores following sinus surgery (Figure 3).

Figure 3.



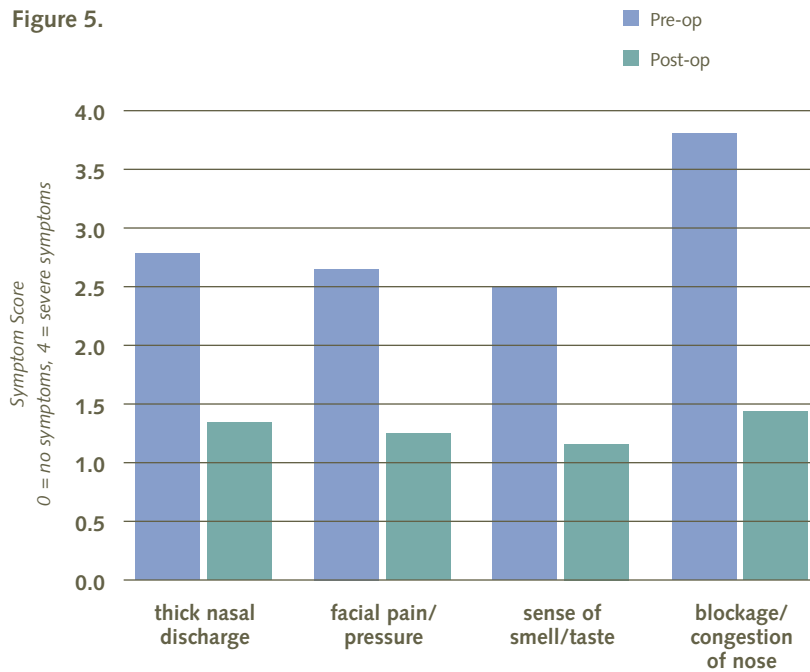
A 22-symptom sinusitis specific questionnaire is used to directly assess patient sinonasal response to operative intervention. At three months, patients report significant improvement in their sinonasal symptoms (this is related as a lower total symptom score) (Figure 4).

Figure 4.



General quality of life scores are assessed using the European Quality of Life 5-Dimension (EQ-5D) test while sinusitis specific symptoms and medication usage are assessed using the Sino-Nasal Outcomes Test (SNOT-22) and the Chronic Sinusitis Survey (CSS). Scores are recorded prior to surgery and at intervals following the operation to methodically chart patient progress over time. We have currently enrolled over 300 patients in just over a year's time, and follow up data is now available for 140 individuals.

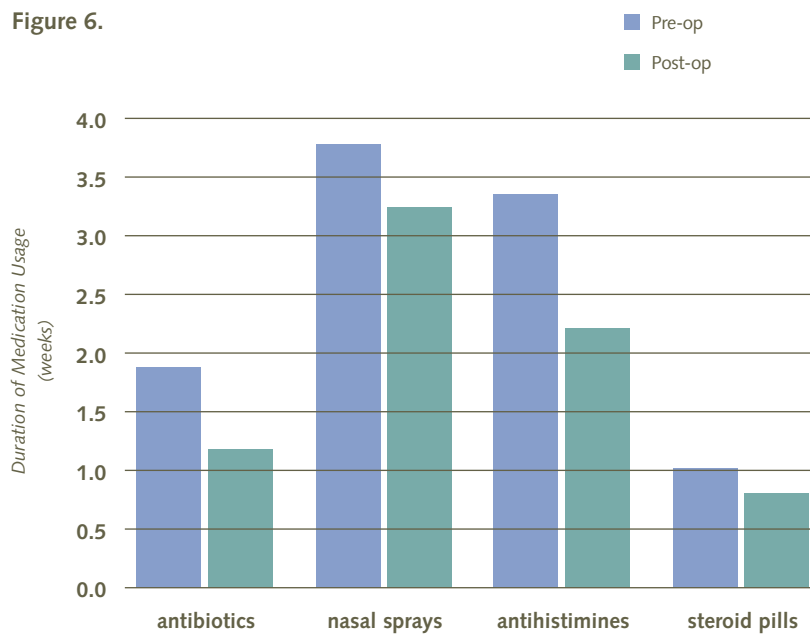
Figure 5.



Collected by Drs. Metson, Gray, Holbrook, and Remenschneider, 2011-2012. (unpublished)

Patients also specifically report improvement in nasal congestion, nasal drainage, facial pain and improved sense of smell (Figure 5).

Figure 6.



Collected by Drs. Metson, Gray, Holbrook, and Remenschneider, 2011-2012. (unpublished)

Medication usage was also found to decline following sinus surgery – for antibiotics, nasal sprays, antihistamines and steroids (Figure 6).

## Thyroid/Parathyroid Surgery Outcomes

The Thyroid and Parathyroid Surgical Division is dedicated to the management of thyroid disorders with a special focus on surgical management of thyroid cancer and its recurrence. The incidence of the most common type of thyroid cancer (Papillary Thyroid Carcinoma) has more than doubled in the last several decades in the United States. Approximately 35% of patients with Papillary Thyroid Cancer have metastatic lymph nodes present when they are first treated for their cancer and up to 20% develop lymph node cancer recurrence after initial treatment. The Thyroid and Parathyroid Surgery Division specializes in these patients with cancer recurrence.

### Recurrent Thyroid Cancer

When the neck needs to be treated surgically for recurrent cancer, the scar from the first procedure can make the surgery more difficult. This is especially true when recurrent cancerous nodes recur in the paratracheal region, the area where the initial thyroid surgery occurred (Figure 1). Revision thyroid cancer surgery typically increases risks for complications, especially the significant complication of recurrent nerve injury (the nerve that runs through the paratracheal region). The recurrent laryngeal nerve powers the vocal cords, and surgical injury to this nerve can result in loss of voice and/or swallowing problems.

### Intraoperative Neural Monitoring during Thyroid Surgery

The Thyroid and Parathyroid Surgical Division utilizes state-of-the-art recurrent laryngeal nerve electrophysiologic intraoperative monitoring to optimize management of this nerve during thyroid surgery and to reduce the risk of surgical injury. The Thyroid and Parathyroid Surgical Division has published world standards in the use of this recurrent laryngeal nerve electrophysiologic intraoperative monitoring system.

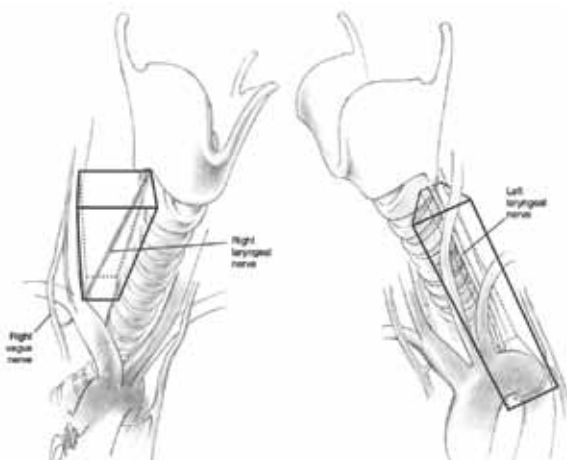


Figure 1. Right and Left Paratracheal Region

The Mass. Eye and Ear Thyroid and Parathyroid Surgical Division performed its 3,000th case in June 2012. This makes the division one of the most experienced neural monitoring units in the world. International monitoring guidelines have been generated using the Division's work as a model.

These areas harbor recurrent thyroid cancer lymph nodes and are the site of the recurrent laryngeal nerves, which power the vocal cords.



### Revision Neck Surgery for Recurrent Thyroid Cancer

From 2004 to 2009, 117 patients underwent revision neck surgery at Mass. Eye and Ear for recurrent thyroid cancer with Dr. G. W. Randolph, Director of the Thyroid and Parathyroid Surgical Division. An ultrasound and neck CT was performed on each patient to accurately identify all lymph nodes that required surgery (See Figure 2).

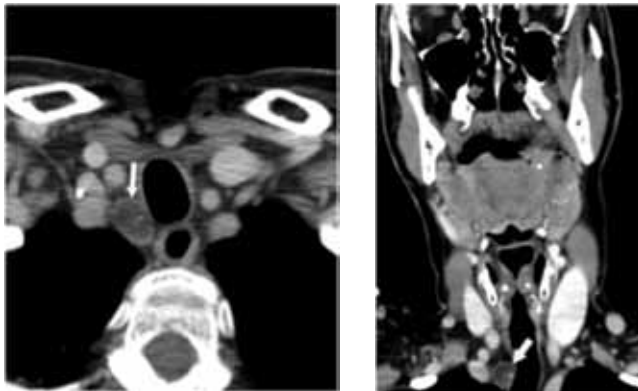


Figure 2. CT Scans showing metastatic neck lymph nodes from recurrent thyroid cancer

In most patients, their revision surgery performed at Mass. Eye and Ear was their first or second revision surgery. However, in some patients their surgery performed at Mass. Eye and Ear was their seventh revision surgery (See Figure 3).

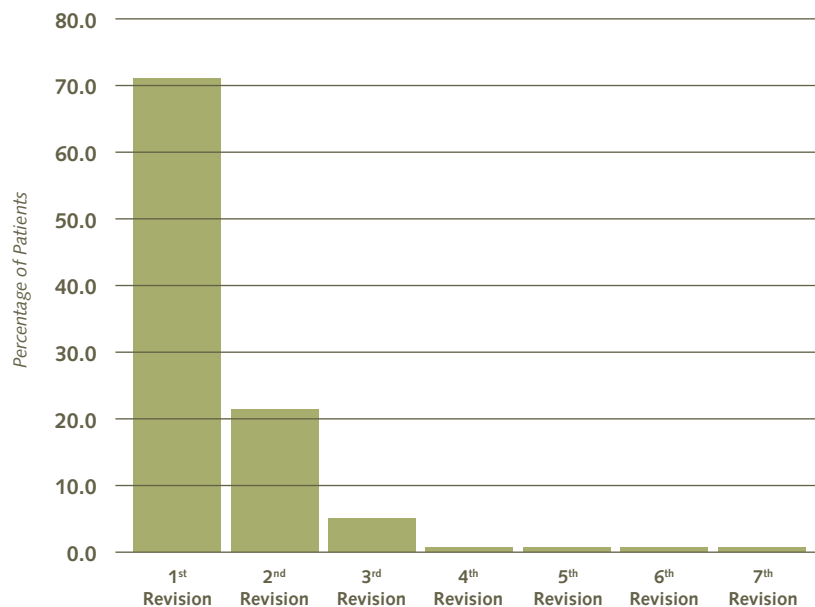


Figure 3. Breakdown of revision surgery by number of revision surgery

Collected by Gregory W. Randolph, M.D., F.A.C.S., and clinical staff, 2004-2009. (unpublished)

In this study, we observed the following outcomes:

- The average duration of revision surgery was 152 minutes (Range: 65-383).
- Average estimated blood loss for revision surgery was 40 mL (Range: 15-100mL).
- Rate of Vocal Cord Paralysis (temporary and permanent) occurring as a complication of revision surgery was zero.

In Figure 2, the white arrow points to a recurrent malignant lymph node. CT scans and ultrasounds are important to map all recurrent thyroid cancer lymph nodes prior to surgery.

In the Thyroid/Parathyroid Surgery Division at Mass. Eye and Ear, most surgeries for recurrent thyroid cancer are revision surgeries, meaning that the patient underwent surgery for thyroid cancer previously. In some patients, up to six prior surgeries were performed before the patient was operated on at Mass. Eye and Ear.

**Revision Neck Surgery — Recurrent laryngeal nerve injury:**

The Thyroid and Parathyroid Surgery Division uses state of the art nerve monitoring equipment to electronically monitor the recurrent laryngeal nerve during surgery. There were no cases of recurrent laryngeal nerve injury, either temporary or permanent, as result of the revision surgery performed at Mass. Eye and Ear. The backdoor approach for recurrent laryngeal nerve and the paratracheal region is utilized in the revision surgeries to avoid scarring from previous surgeries (see Figure 4).



**Figure 4. Backdoor approach for revision thyroid surgery**

Several types of cancer may recur and require revision neck surgery. The most common type of thyroid cancer requiring revision surgery was papillary thyroid cancer (89.9%) followed by medullary thyroid cancer. Both of these types of thyroid cancer are characterized by high rates of lymph node metastasis. The least common cancer was insular thyroid cancer (0.8%) (See Table 1).

Type of Thyroid Cancer (total = 117)	Number of cases	%
Papillary.....	105	89.8
Medullary.....	6	5.1
Insular.....	1	0.8
Hurthle cell.....	5	4.3

**Table 1: Types of thyroid cancer as seen in our revision cases**

*Collected by Gregory W. Randolph, M.D., F.A.C.S., and clinical staff, 2004-2009. (unpublished)*

Recurrent laryngeal nerve injury can result in 1) loss of voice, 2) swallowing dysfunction, and 3) potential breathing problems and the need for permanent tracheotomy.

None of the patients operated on for recurrent thyroid cancer at Mass. Eye and Ear suffered vocal cord paralysis.

## Laryngology: Injection Laryngoplasty Outcomes

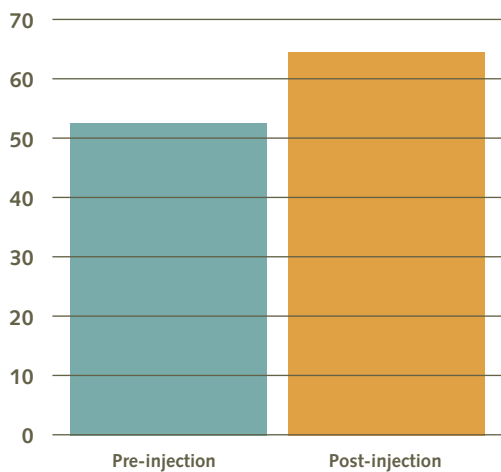
The Laryngology Division treats a variety of disorders of the voice box and upper airway in adults, with a clinical focus on voice preservation, cancer of the larynx, swallowing disorders, and airway reconstruction.

In 2011, the division performed 101 awake, in-office injection laryngoplasty procedures for a variety of causes for glottic insufficiency, including vocal fold scarring (sulcus deformity) or decreased vocal fold motion (paresis or immobility).

The Voice Related Quality of Life (VRQoL) scale is used to measure patient-perceived improvement in the voice and the ability to communicate verbally. The results are not specific to any one symptom (hoarseness, weakness of voice, inability to project, or vocal fatigue), but rather represent overall improvement in quality of life after treatment. The higher the score, the better the result.

Twenty-five patients in 2011 completed both the pre- and post-procedure surveys to contribute to our VRQoL data. The mean pre-procedure score was 52.7 (SD 21.9), while the mean post-procedure score was 64.6 (SD 25.8). There was a statistically significant improvement between the two groups ( $p = 0.004$ )

### Total VRQoL Scores

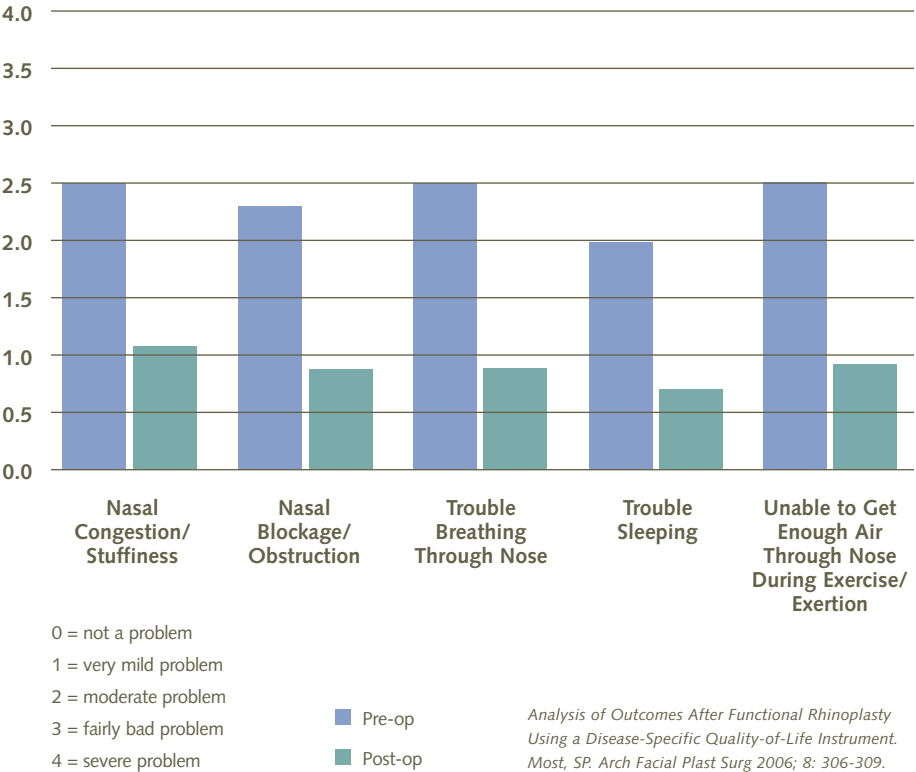


*Collected by Ramon A. Franco, Jr., M.D., and clinical staff, 2011-2012. (unpublished)*

# Facial Plastic and Reconstructive Surgery: Rhinoplasty Outcomes

Patients who present to the Massachusetts Eye and Ear Facial Plastic and Reconstructive Surgery Division with breathing problems sometimes require rhinoplasty, in which the external appearance to the nose is modified in order to correct the breathing problem. Conversely, some patients come requesting changes to their nasal appearance but do not realize that their breathing could be improved as well. Patients with such nasal problems are treated with a global approach to assure that we have optimized their outcomes after surgery.

Sixty-one patients who presented to Dr. DeRosa from 2009-2011 for rhinoplasty (both functional and aesthetic) were asked to report on the impact of their nasal breathing on their quality of life. This was measured using the validated Nasal Obstructive Symptoms Evaluation Scale (NOSE) both before and after surgery. Patients were asked to rate how much of each issue (as seen on the graph below) was a problem for them over the previous month with the following possible answers: 0- not a problem, 1- very mild problem, 2- moderate problem, 3- fairly bad problem, and 4- severe problem.



As compared to the preoperative nose-related quality of life, patients undergoing rhinoplasty for both functional and aesthetic reasons reported improvement in each of the measures listed. It is one of our missions to not only improve the appearance of noses but to also achieve improved nasal breathing and overall quality of life for our rhinoplasty patients. We believe that nasal function and appearance go hand-in-hand.



before



after



before



after



before



after



before



after

This series of pre-operative and post-operative photographs show functional and aesthetic improvements made in a rhinoplasty patient.

# Head and Neck Surgical Oncology: Oropharyngeal Cancer Outcomes

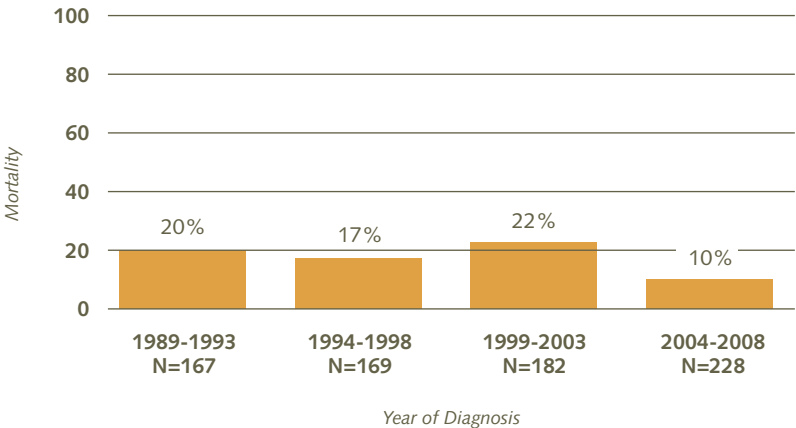
The Head and Neck Surgical Oncology Division at Mass. Eye and Ear in collaboration with the Medical Oncology and Radiation Oncology departments at Massachusetts General Hospital is a leading cancer care center, treating a large volume of head and cancer patients with tumors arising from all sites within the upper aerodigestive tract, salivary glands, and the skin.

In recent years, there has been a nationwide increase in the number of oropharyngeal cancer cases. Figure 2 shows that in the past five years we have seen a 24% increase in the number of oropharyngeal cancer cases. Additionally we have seen a shift in the demographics of this population as seen in Figures 3, 4, and 5. This has led us to increase our research efforts to better understand this disease. It has also led us to carefully consider personalized treatment options tailored for each patient and their cancer.

This increased volume and research efforts has allowed us new opportunities to offer patients all potential treatment options. This includes surgical options such as transoral (robotic and endoscopic) resection as well as open procedures requiring complex reconstructive surgery. Additionally, our collaboration with MGH provides access to the state-of-the-art radiation therapy resources and medical oncology resources including all common practice treatments as well as enrollment in clinical trials.

## Summary Statistics for Oropharynx Squamous Cell Carcinoma Patients Diagnosed at MGH/Mass. Eye and Ear Between 1989 and 2008

Figure 1. Five-Year Mortality



Through this clinical experience and collaboration with our basic science research labs, we have seen a significant improvement in survival during this time period. Figure 1 shows that five-year survival has increased from 78% to 90%. This represents a substantial improvement.

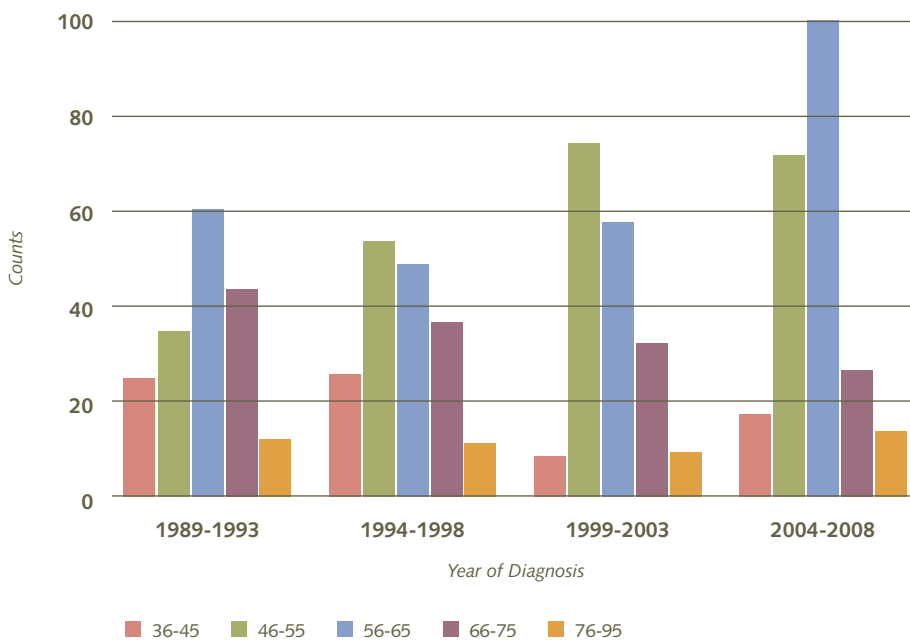
In the future, we will continue to try to further improve the survival, but also focus on improving quality of life after treatment by personalizing treatments, research activities, providing support personell, and strong relationships with rehabilitative teams such as voice and speech and swallowing disorder specialists.

Figure 2. Number of Patients



Total number of patients = 758

Figure 3. Age at Diagnosis



average age  
 1989-1992 = 60  
 1994-1998 = 58  
 1999-2003 = 58  
 2004-2008 = 58  
 all = 58.5

median age  
 1989-1992 = 60  
 1994-1998 = 59  
 1999-2003 = 57  
 2004-2008 = 57  
 all = 58

Figure 4. Gender

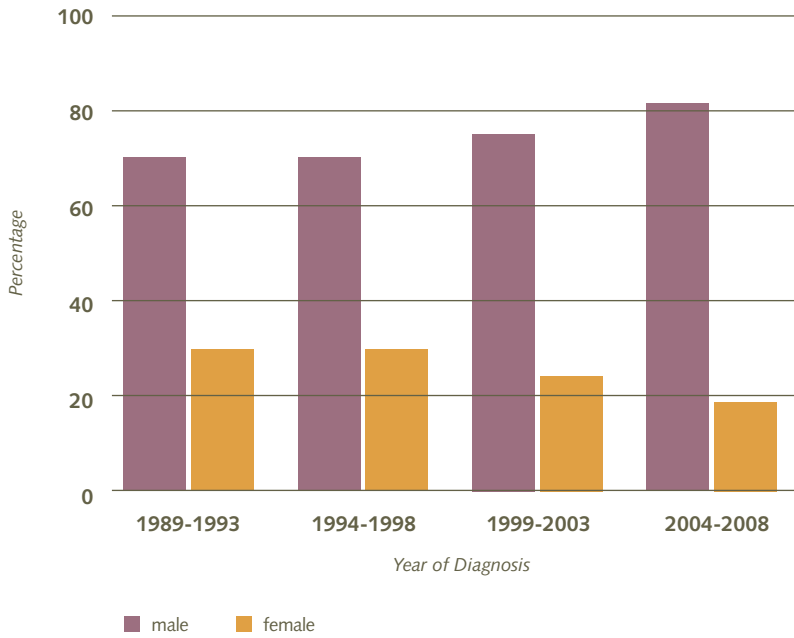
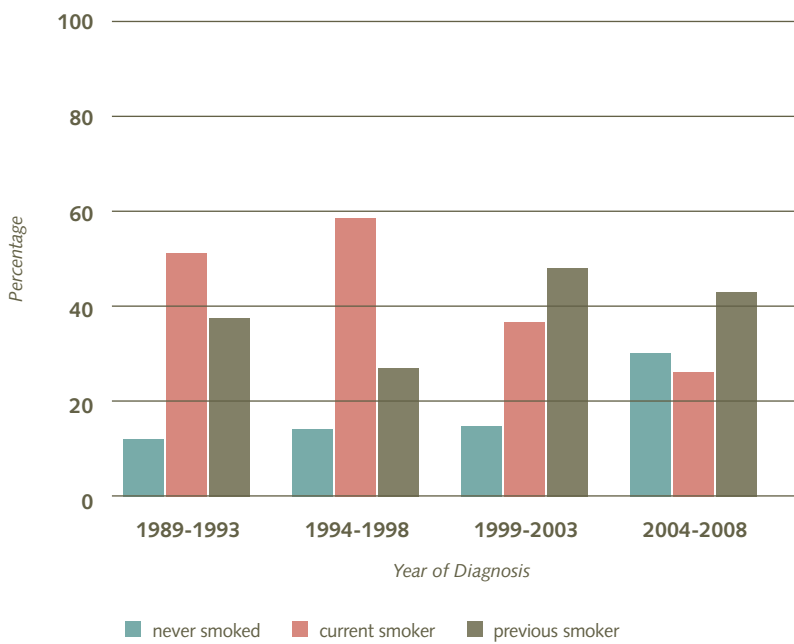


Figure 5. Smoking Status



patient totals:  
never smoked = 112  
current smoker = 245  
previous smoker = 236  
total = 593



Massachusetts Eye and Ear Infirmary

RADIOLOGY DEPARTMENT

The Department of Radiology at Mass. Eye and Ear is one of the only radiology departments in the world that is exclusively devoted to the care of patients with disorders of the eyes, ears, nose, throat, head and neck. This central focus brings a specialization that significantly contributes to the successful outcomes of our patients.

In January 2012, the Department of Radiology implemented a new automated CT informatics system for contrast-enhanced imaging that enables evidence-based decision making to improve patient outcomes, create workflow efficiencies and facilitate compliance. Despite wide variances in patients, procedures and staffing, this new system consistently provides the following quality improvement opportunities:

- Personalized contrast-enhanced imaging
- Integrated patient/study information with clinical systems
- Automated record keeping processes
- Improved workflow efficiencies
- Management of risks of contrast media injected intravenously
- Real-time and flexible access to more complete and accurate data, such as extravasation incidents (atypical events), contrast media flow rates and pressure

This quality management tool and application instantly integrates each patient's CT contrast injection record with the associated clinical image sets stored in PACS allowing our radiologists to gain efficiencies in conducting real-time or retrospective image analysis. Data collection for 2012 is underway and will be reported in the next Quality and Outcomes edition.

**Radiology Quality Assurance data results from 2011 include the following:**

- Critical Test Result Reporting (stat exam results provided within 30 minutes): 85% compliance (radiologist to MD communication)
- Double Read Monitor (re-review of image interpretation by secondary radiologist): 192 exams approved/confirmed and nine referred back to originating radiologist (eight referred for information only and one referred for clinical addendum to report)
- Report Turnaround Time (goal is less than three business days): achieved annual average of 1.97 business days

## Massachusetts Eye and Ear Infirmary

# NURSING DEPARTMENT

The Department of Nursing at Mass. Eye and Ear is a service-oriented department dedicated to providing safe, effective, patient-centered, timely, efficient, and equitable care to our adult and pediatric patients.

The Department of Nursing believes that the knowledge base of professional nursing is derived from the biological, psychological, physical, and social sciences and that quality nursing care arises from the clinical application of evidence based care.

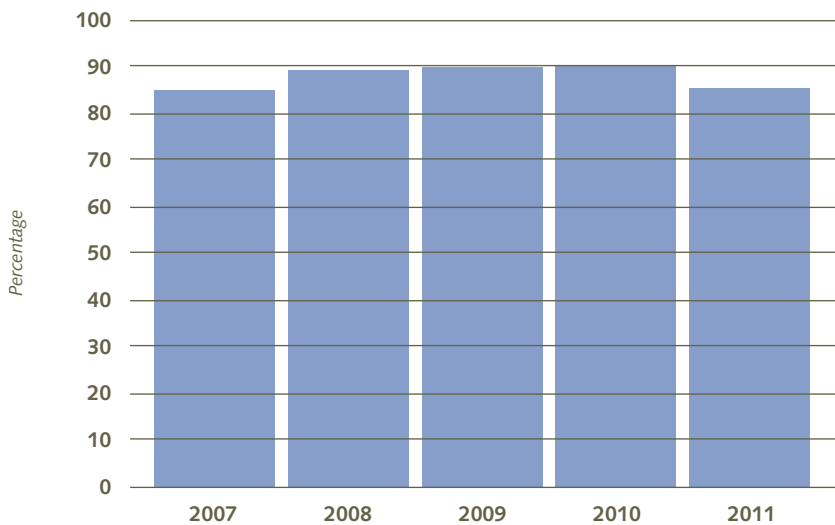
Nursing care is delivered within a framework of care, compassion, and respect for the dignity of the patient and their family or significant other using a patient-centered care model.

During 2011, the Department of Nursing defined quality and outcome measures with the aim of providing quality nursing care to our patients to restore them to their optimal level of health.

## The Nursing Work Environment

The Department of Nursing recognizes that a professional work environment supports professional practice and improves patient outcomes. The Department of Nursing conducts an annual nursing work environment survey to assess the professional practice environment of its nursing staff. This voluntary survey, completed by 86% of the registered nurse workforce in 2011, is designed to assess how the nurses feel regarding the quality of care they deliver, and their Nurse-Physician relations.

### Nursing Practice Environment Scale (PES) Annual Response Rate

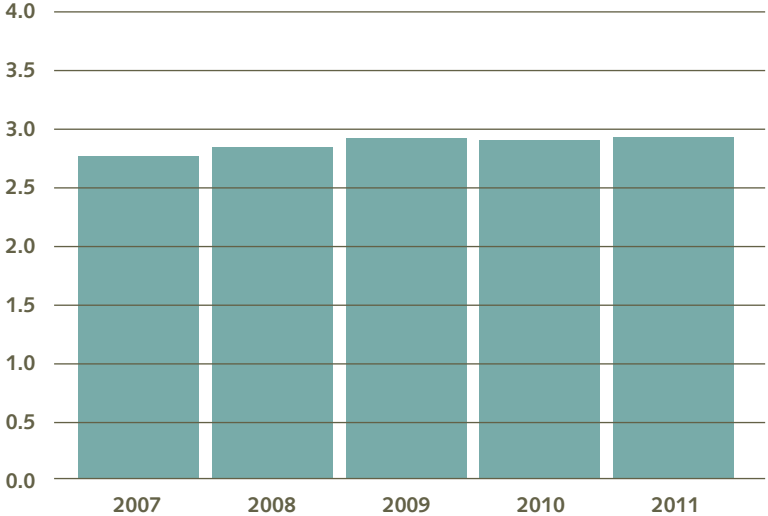


As a member of the National Database of Nursing Quality Indicator (NDNQI®), the Department of Nursing has chosen the RN Survey with Practice Environment Scale (PES) survey tool for this annual assessment of the Nursing Practice Environment.

The PES is endorsed by the National Quality Forums and includes a focus on:

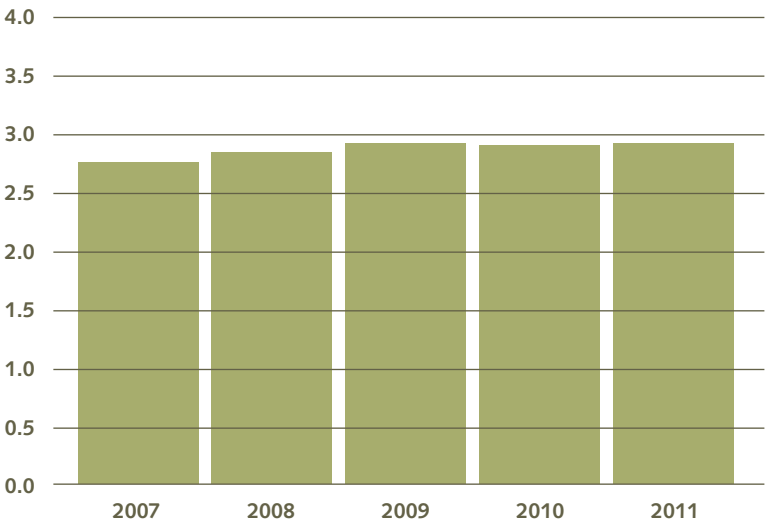
- Nursing Foundation for Quality of Care
- Collegial Nurse-Physician Relations

### Nursing Foundation for Quality of Care



Using a 1-4 scale, our nurses assessed the quality of the care they delivered. Elements of this assessment included the high standards of nursing care expected, competence of their peers, and if there is a clearly defined philosophy of nursing.

### Collegial Nurse-Physician Relations

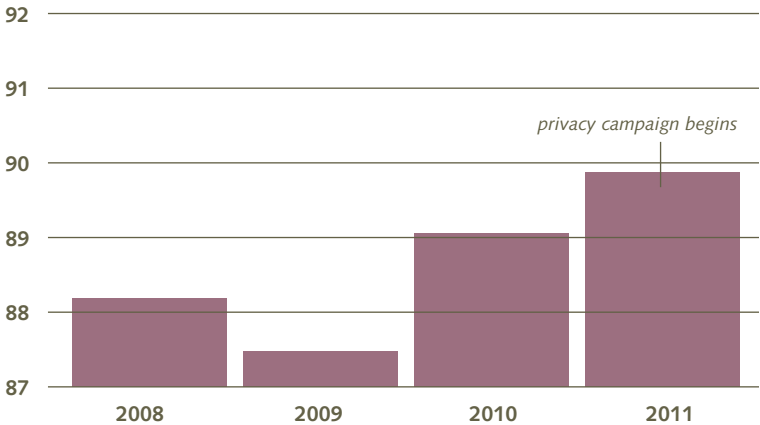


The nurse-physician relations assessment included questions related to team work and collaboration between the disciplines.

The 2011 PES survey results have shown favorable improvements in all PES categories.

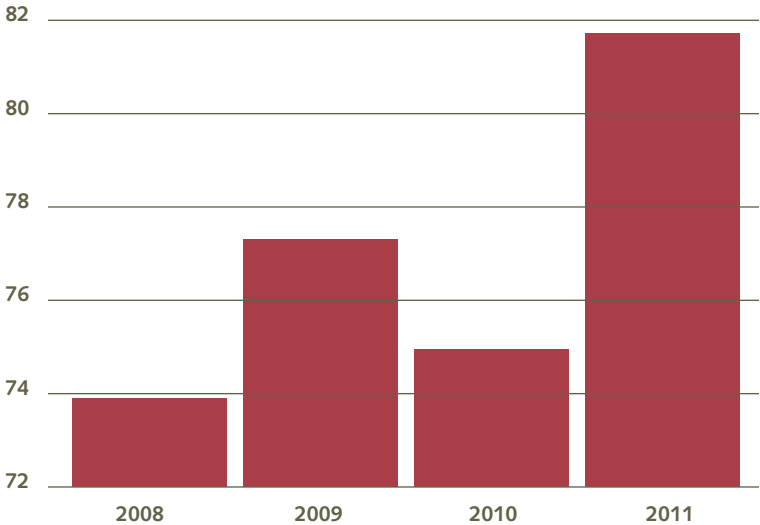
## Improving the Patient Experience

During 2011, improving patients' perception of our concern for their privacy was identified as an organizational priority and the Department of Nursing embraced this priority and established it as a quality measure.



The inpatient population at Mass. Eye and Ear represents a group of high acuity, complex patients. These patients are cared for by skilled specialty nurses in a professional collaborative environment.

## Hospital Consumer Assessment of Healthcare Providers and Systems (H-CAHPS) Nurses Treat with Courtesy/Respect



The Privacy Campaign was rolled-out and there were a number of improvement opportunities identified by the nursing staff. The Department of Nursing's top priority is to always exceed the patient's and family's expectations and we continue to meet and exceed this goal.

Additionally, we collect patient falls data and healthcare acquired pressure ulcer prevalence at the unit level and the data analysis is favorable for these nurse-sensitive quality measures.

We continue to perfect and enhance our electronic variance reporting and report our falls and pressure ulcer prevalence data externally to ensure transparency.

### **Ensuring Quality and Patient Safety in the Clinical Practice Areas**

Simulation training for Pediatric Emergency Care was identified as a clinical practice quality improvement initiative for 2011. This multidisciplinary experience provides the clinical staff with hands on learning for emergency care as well as team training.

During 2011, there were four simulation events conducted. In a controlled setting, participants worked as a team to improve their performance and strengthen their confidence and skills.

## Ophthalmology Full-Time Faculty Listing

### **Comprehensive Ophthalmology and Cataract Consultation**

**617-573-3202**

Service Director: Sherleen H. Chen, M.D., F.A.C.S.  
Sheila Borboli-Gerogiannis, M.D., F.A.C.S.  
Stacey C. Brauner, M.D.  
Kenneth Chang, M.D., M.P.H.  
Matthew F. Gardiner, M.D.  
Scott Greenstein, M.D., F.A.C.S.  
Carolyn E. Kloek, M.D.  
Zhonghui Katie Luo, M.D., Ph.D.  
Lynn Poole-Perry, M.D., Ph.D.

### **Cornea and External Disease**

**617-573-3938**

Service Director: Reza Dana, M.D., M.Sc., M.P.H.  
James Chodosh, M.D., M.P.H.  
Joseph B. Ciolino, M.D.  
Kathryn A. Colby, M.D., Ph.D.  
Claes H. Dohlman, M.D., Ph.D.  
Pedram Hamrah, M.D.  
Deborah S. Jacobs, M.D.  
Ula V. Jurkunas, M.D.  
Deborah P. Langston, M.D., F.A.C.S.  
Samir A. Melki, M.D., Ph.D.  
Roberto Pineda, II, M.D.

### **Emergency Ophthalmology and Eye Trauma**

**Emergency Department: 617-573-3431**

Service Director: Matthew F. Gardiner, M.D.

**Eye Trauma: 617-573-3022**

Service Director: Peter Veldman, M.D.  
Justin Kanoff, M.D.

### **Glaucoma**

**617-573-3670**

Service Director: Louis R. Pasquale, M.D.,  
F.A.R.V.O.  
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Teresa C. Chen, M.D., F.A.C.S.  
Cynthia L. Grosskreutz, M.D., Ph.D.  
Douglas J. Rhee, M.D.  
Lucy Q. Shen, M.D.  
Angela V. Turalba, M.D.

### **Neuro-Ophthalmology and Adult Strabismus**

**617-573-3412**

Service Director: Joseph F. Rizzo, III, M.D.  
Dean M. Cestari, M.D.  
Simmons Lessell, M.D.

### **Ophthalmic Pathology**

**617-573-3319**

Service Director: Frederick A. Jakobiec,  
M.D., D.Sc.  
Thaddeus P. Dryja, M.D.  
Rebecca Stacy, M.D., Ph.D.  
Anat Stemmer-Rachamimov, M.D.

### **Ophthalmic Plastic Surgery**

**617-573-5550**

Service Director: Suzanne K. Freitag, M.D.  
Aaron M. Fay, M.D.  
Daniel Lefebvre, M.D.  
Francis Sutula, M.D.  
Michael K. Yoon, M.D.

### **Optometry/Contact Lens**

**617-573-3185**

Service Director: Jill E. Beyer, O.D.  
Andrew Baker, O.D.  
Mark Bernardo, O.D.  
Kimberly Chan, O.D.  
Calliope Galatis, O.D.  
Charles D. Leahy, O.D., M.S.  
Amy Scally, O.D.  
Amy C. Watts, O.D.

### **Optical Services**

**617-573-3185**

**Fax: 617-573-3598**

### **Pediatric Ophthalmology and Strabismus**

(a collaboration on-site with Children's Hospital)

**617-355-6401**

Service Director: Melanie A. Kazlas, M.D.  
Linda R. Dagi, M.D.  
Gena Heidary, M.D., Ph.D.  
Danielle M. Ledoux, M.D.  
Iason Mantagos, M.D.  
Ankoor Shah, M.D., Ph.D.

### **Refractive Surgery**

**617-573-3234**

Service Director: Roberto Pineda, II, M.D.  
Ula V. Jurkunas, M.D.  
Samir A. Melki, M.D., Ph.D.

### **Retina**

**617-573-3288**

Service Director: Evangelos S. Gragoudas, M.D.  
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Dean Elliott, M.D.  
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### **Retinal Degenerations/ Electroretinography (ERG) Service**

**617-573-3621**

Service Director: Eliot L. Berson, M.D.  
Jason Comander, M.D., Ph.D.  
Alexander R. Gaudio, M.D.  
Eric A. Pierce, M.D., Ph.D.  
Michael A. Sandberg, Ph.D.

### **Uveitis and Immunology**

**617-573-3591**

Service Director: George N. Papaliodis, M.D.  
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### **Vision Rehabilitation**

**617-573-4177**

Service Director: Mary Louise Jackson, M.D.  
Kevin Houston, O.D., F.A.A.O.  
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## Otolaryngology Full-Time Faculty Listing

### General Otolaryngology

Gregory W. Randolph, M.D., F.A.C.S.\*,  
617-573-4115  
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### Thyroid/Parathyroid Surgery

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Robin W. Lindsay, M.D.

### Dermatology/Mohs Dermatologic Surgery

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### Laser Reconstructive Surgery

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### Head and Neck Surgical Oncology

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Jayme R. Dowdall, M.D. (Oct. 2012)

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### Suburban Centers

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#### Mass. Eye and Ear, Stoneham

**781-279-0971**  
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**Audiology Services, 508-350-2800**

#### Mass. Eye and Ear, Balance and Vestibular Center at Braintree Rehabilitation Hospital

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#### Mass. Eye and Ear, Concord

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Michael H. Fattal, M.D.

#### Mass. Eye and Ear, Weymouth-Duxbury

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