The Mass. Eye and Ear logo signifies the sun rising over rolling ocean waves, suggesting sight and sound.
We are proud to present Massachusetts Eye and Ear’s first combined Quality and Outcomes Report. This publication follows on the successful 2009-10 launch of our individual Quality and Outcomes Reports in Ophthalmology and Otolaryngology. Combining and highlighting data from all of our clinical departments seemed a natural next step and creates a full view of our highly specialized care and surgery.

With the leadership of our Department Chairs (Joan W. Miller, M.D.; Joseph B. Nadol, Jr., M.D.; Hugh Curtin, M.D.; and Sunil Eappen, M.D.), the commitment of our physicians, and the passion of our staff working as a team, we believe that best quality is demonstrated by best outcomes. The overarching goal of this publication is to drive quality improvement and, therefore, deliver the best patient care possible. In some instances, we openly compare ourselves to the few established national benchmarks in our specialties; but in many more instances we are creating the benchmarks by collecting and publishing results. As with our earlier publications, we hope this serves to open communication and dialogue among providers around the world.

In addition to fostering transparency and accountability, the Mass. Eye and Ear quality team has also focused on improvements to service, patient safety, effective treatments and cost efficiencies. An electronic version of this report and Mass. Eye and Ear’s overall Quality Plan is available on our website at MassEyeAndEar.org.

We would like to acknowledge the leadership and hard work of the Mass. Eye and Ear Quality leadership team: Linda Belkner, R.N.; Teresa Chen, M.D.; Alec Cheloff; Sunil Eappen, M.D.; Gayle Fishman, R.N., B.S.N., M.B.A.; Christopher Hartnick, M.D.; and Mary Kennedy.

It is our hope that this publication will both help determine some of the universal standards that should be reported by our disciplines, and provide patients with the insights they seek when turning to us for life-altering care.
Clinical Leadership in Quality: 2010-2011

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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 17 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 ophthalmologic and otolaryngologic resources available.

### Fiscal Year 2010 Volume

<table>
<thead>
<tr>
<th>Service</th>
<th>Volume</th>
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<tbody>
<tr>
<td>Outpatient Services</td>
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<tr>
<td>Ambulatory Surgical Services</td>
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<td>Inpatient Surgical Services</td>
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<td>Emergency Department Services</td>
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<td>Discharges</td>
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</table>

Fiscal Year 2010 Beds ............................................. 42

Fiscal Year 2010 Overall Operating Revenue .... $246,262,849
National Guardsman, Greg Page, was newly married and about to leave for his honeymoon when he noticed a painful bump on his tongue. The 29-year-old non-smoker assumed it was a harmless canker sore, but visits to his dentist, then a head and neck specialist at Mass. Eye and Ear, revealed more. Greg had cancer: specifically poorly differentiated squamous cell carcinoma of the oral tongue.

During a seven-hour surgery, Greg had a third of his tongue removed, replaced with live tissue from his left forearm, which was partially replaced yet again by a small part of his left thigh. He also had a radical neck dissection to remove affected lymph nodes.

Now serving in Afghanistan, Greg is doing well. “The doctors and staff at Mass. Eye and Ear took incredibly good care of me, and actually went to extraordinary medical lengths to save my career by removing enough lymph nodes to conclusively rule out metastasis and thereby spare me from radiation,” he said. “They also went to bat for me when I explained how much I wanted to come on this deployment, and they found a way to make it work with the check-up schedule.”

Greg recently became a new father. He’s finishing up his last tour in Afghanistan and will attend the MIT Sloan School of Management in the fall. He speaks normally and his scars are fading. Best of all, this year he was able to celebrate his first Father’s Day, cancer-free.
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 has 17 operating rooms at its main campus that are split between a Main Operating Room (MOR) which has 12 rooms and a Surgery Center (SC) which has 5 rooms. The majority of the cases that occur in the SC are ophthalmologic, 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 occur in the MOR.

The Ophthalmology and Otolaryngology surgical volumes are split fairly evenly, and the numbers have been consistently rising over the last several years.
Mass. Eye and Ear cares for the most pediatric otolaryngologic patients in the area and for more pediatric surgical patients than any hospital except Children’s Hospital Boston. 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 ophthalmologic 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 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 awaken 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.
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 consultations and coordination of inpatient consultations for urgent patient care concerns at MGH.
  – High-risk diabetes patients are screened by Mass. Eye and Ear staff for diabetic eye disease through the MGH Chelsea Health Center teleretinal screening program.

• 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. A new, 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 Children’s Hospital Boston.
  – Children’s 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.
• Mass. Eye and Ear Medical Unit, staffed by MGH physicians.
• Mass. Eye and Ear Radiology Department houses a dedicated MRI/CT imaging suite.
• 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.
• The International Program offers patients assistance with appointments, transportation, accommodations and language translation.
• Full service Contact Lens Service specializes in therapeutic fits, bandage and specialty contact lenses.
• Dedicated Social Work and Discharge Planning Department.

For more information about the Mass. Eye and Ear Quality Program or the Department of Ophthalmology, please visit our website at www.MassEyeAndEar.org.
This bar graph shows the number of ophthalmology patients seen monthly by the Emergency Department during a one-year period. Patient volume generally increases in the summer. The average number of patients seen each month was 1,050.

In 2010, the average ophthalmology visit time at the Mass. Eye and Ear Emergency Department was 2.1 hours. The average visit time is defined as the total time from when the patient arrived at the 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 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.

The average ophthalmology visit time in the Mass. Eye and Ear Emergency Department is almost half the average state and national visit times.
Joe Wright, the owner of a small construction company, was helping one of his workers remove a particularly stubborn nail when it shattered and struck him in the eye. He didn’t know at the time that he was injured so severely he could potentially lose his vision.

When Joe’s eye got worse despite treatment in his town, his wife, Heather, insisted he come to Boston and Mass. Eye and Ear’s emergency room. A few hours later he was in an operating room having an open-globe injury repaired. Joe developed a cataract because of the trauma, which he also had removed at Mass. Eye and Ear.

“When faced with the reality that I could lose the vision in my eye, all I could think was ‘how am I going to support my family?’” Joe said.

Today Joe has 20/20 vision in his injured eye, and he routinely wears safety glasses.
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.1

During a one-year period, 96 patients had open-globe repair by the Mass. Eye and Ear Eye Trauma Service. Of the 96 patients, visual acuity at presentation was recorded in 91 patients. Visual acuity was not possible in five patients: two were intubated at presentation, two suffered from dementia, and one was an infant. At the time of publication, 58 patients had five months or greater 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 2010 calendar year, 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. 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.

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.

Achieving Target Refraction (Spherical Equivalent)
January 2010 to December 2010

During a one-year period, the Comprehensive Ophthalmology Service performed cataract surgery on 1,369 eyes at the Mass. Eye and Ear main Boston campus. This chart depicts the results of 1,285 eyes that had one month of follow-up data.

References:

Ninety-three percent of cataract patients achieved within one diopter of target refraction after cataract surgery. In summary, Mass. Eye and Ear cataract surgery results exceed international benchmarks.
The Retina Service at Mass. Eye and Ear is one of the largest subspecialty groups of its kind in the country. Our physician scientists are highly skilled at diagnosing and treating a full range of ocular diseases, including macular degeneration, diabetic retinopathy, retinal detachments and ocular tumors.

Primary rhegmatogenous retinal detachment is one of the most common retinal conditions that require a major operation by the Mass. Eye and Ear Retina Service. Of the 621 major operations performed on 312 patients by the Retina Service during the 2010 calendar year, this analysis includes only operations for primary rhegmatogenous retinal detachments. Exclusion criteria included non-rhegmatogenous retinal detachments, 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. This left 63 eyes for analysis.

Retinal reattachment was successfully achieved in 97% (61/63) of patients age 18 or older with a primary rhegmatogenous retinal detachment and no history of previous retinal surgery. One or more techniques may have been used for retinal repair and included pars plana vitrectomy, scleral buckle, and pneumatic retinopexy. A review of the literature suggests that the primary success rate of rhegmatogenous retinal detachment repair ranges from 64% to 91%.

In conclusion, 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 in the literature.

Over a four-year period, the overall incidence rate of endophthalmitis subsequent to intravitreal injection was 0.04% (three of 7,585 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).


(Left) photograph of endophthalmitis

Photo courtesy of Lucy H. Young, M.D., Ph.D., F.A.C.S.
One of the most active octogenarians you’ll ever meet, Fran Hall works professionally as a psychotherapist, skis in the winter, plays tennis year-round, sings in a chorus, restores furniture and participates in a book club. Even more incredible, Fran maintains this lifestyle 15 years after she was first diagnosed with glaucoma and several years after sight-saving surgery at Mass. Eye and Ear.

Glaucoma is the second leading cause of blindness in the United States and the leading cause for people of African and Latino descent. The cause of glaucoma is unknown. There is no cure, but personalized treatment and surgery can help extend vision.

Fran knows the importance of individualized care first-hand. She controlled glaucoma pressure in her eyes for more than a decade with medicated eye drops and laser treatments. But the pressure in both of Fran’s eyes continued to rise and the treatments gradually became less effective. Her ophthalmologist referred her to glaucoma specialist, Dr. Douglas Rhee.

Since the traditional surgical procedure to treat glaucoma, called a trabeculectomy, would have meant approximately two months of inactivity for Fran, Dr. Rhee suggested the trabectome procedure to her.

The surgery was performed and as expected, Fran’s recovery time was short and she was back on the court swinging her tennis racket in no time. The pressure in both of Fran’s eyes remains under control.

“I’m one happy camper,” she says.
Glaucoma is a group of disorders in which the main risk factor is high eye pressure within the eye. 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. The Mass. Eye and Ear Glaucoma Consultation Service can perform a wide range of laser and surgical procedures.

In summary, the Mass. Eye and Ear Glaucoma Consultation Service has one of the lowest trabeculectomy and tube shunt infection rates reported in the literature.

Glaucoma Surgery

Glaucoma Surgery

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.

During a one-year period, the Glaucoma Consultation Service performed trabeculectomy surgery (with or without previous scarring) on 104 eyes and performed tube shunt surgeries (primary or revision) on 141 eyes. Zero cases of endophthalmitis were reported.

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%.

Trabeculectomy and Glaucoma Implant Surgery: Intra-operative Complications
January 2010 to December 2010

Of the 245 cases of trabeculectomy surgery or glaucoma implant surgery over a one-year period, 95.5% of patients had no intra-operative complications.

The Mass. Eye and Ear Glaucoma Consultation Service has some of the lowest intra-operative complications rates reported in the literature.

The 245 cases evaluated included:
- 96 trabeculectomies without scarring
- 8 trabeculectomies with previous scarring
- 140 primary tube surgeries
- 1 tube revision

Mass. Eye and Ear Complication Rates:
- Conjunctival tear/buttonhole: 2.04%
- Hyphema: 1.22%
- Scleral flap trauma: 0.41%
- Vitreous loss (vitreous prolapse): 0.41%
- Suprachoroidal hemorrhage: 0.41%
- Scleral perforation: 0%

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

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).

Of the 296 eyes that had LASIK during the one-year study period, 2.7% (8/296) had an enhancement/retreatment procedure within six months.

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


Enhancement/Retreatment Rates at Six Months Follow-up
January 2010 to December 2010

The Mass. Eye and Ear Cornea and Refractive Surgery Service has some of the lowest enhancement/retreatment rates after LASIK surgery in the country.
Of the 296 eyes that had LASIK surgery during the one-year study period, 281 had sufficient follow-up data for analysis. These data are the results after LASIK at one month follow-up for myopia and at three months follow-up for hyperopia.

The overall LASIK success rate for achieving within 0.5 diopters of target refraction was 86.1% (242/281 eyes). The success rate was 86.9% for myopia (219/252 eyes) and 79.3% (23/29 eyes) for hyperopia.

National benchmark data from FDA trials for LASIK for myopia showed that 71.6% of eyes resulted in a refractive error within ±0.50 diopters of the target correction.1

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

January 2010 to December 2010

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

Of the 169 corneal transplant surgeries performed at the Mass. Eye and Ear during a one-year period, 112 (66%) were full thickness cornea transplants, also called penetrating keratoplasties. Of the 97 penetrating keratoplasties for which sufficient follow-up data is available for analysis, 71 (73%) were elective and 26 (27%) were non-elective. Non-elective penetrating keratoplasties include those performed emergently (e.g. for corneal perforation or severe microbial keratitis unresponsive to medical therapy) and those done in combination with complex (e.g. retinal or glaucoma) surgeries. This analysis was limited to elective penetrating keratoplasties, which included first time grafts in uninflamed host beds as well as those performed in eyes at high risk of rejection. Indications for routine penetrating keratoplasty included Fuchs’ endothelial dystrophy, keratoconus, prior failed graft, and corneal scar.

The Department of Otolaryngology at Mass. Eye and Ear is committed to the highest level of care for patients facing problems related to the ears, nose, throat, head, and neck. As Otolaryngology encompasses a comprehensive range of subspecialties, our services include but are not limited to hearing and ear disorders, pediatric otolaryngology, head and neck cancer, voice impairment, thyroid and parathyroid surgery, and facial nerve disorders. This specialized, collaborative approach from our internationally-renowned team of physicians significantly contributes to the excellent outcomes they achieve for their patients.
While each of our physicians is board certified in Otolaryngology by the American Board of Otolaryngology, many hold additional board certification in other areas of specialty. Many are also fellowship-trained, furthering their expertise in these subspecialty areas. Our team combines highly specialized training, expert care, and compassion in the medical management and/or surgical treatment of patients with ear, nose, and throat problems.

With such a diverse range of specialties offered within the Department of Otolaryngology, one of our greatest advantages is the opportunity for all our specialists and subspecialists to work in close proximity to one another, and to collaborate in the diagnosis and coordination of complex treatment plans of their patients. Other areas of Department collaboration include:

- Primary teaching hospital of Harvard Medical School’s Department of Otolaryngology
- Home to Eaton-Peabody Laboratory, Jenks Vestibular Lab, Cochlear Implant Research Lab, Otopathology Lab, and Temporal Bone Consortium Temporal Bone Registry

Clinical Affiliations
- Massachusetts General Hospital Department of Otolaryngology
- Brigham and Women’s Hospital: Otology

Academic Affiliations
- Massachusetts General Hospital
- Brigham and Women’s Hospital
- Beth Israel Deaconess Medical Center
- Children’s Hospital Boston
Pediatric Otolaryngology
Tonsillectomies

These percentages represent children undergoing tonsillectomy or tonsillectomy & adenoidectomy who then needed to return to the emergency department (ED) for evaluation for possible post-operative bleeding. These cases may have had silver nitrate treatment in the ED, but they did not require cautery in an operating room setting. The U.S. benchmark for ED evaluation for bleeding after these procedures is 2.2 - 7.8%.
Breathing Easier and Thriving

Francisca Fetuga didn’t get a good night’s sleep for the first two years of her son’s life. She would listen to her son’s labored breathing while he slept and worry. His sleep apnea, periods during sleep where he would stop breathing altogether, was alarming. Two-year-old Adekanmi wasn’t able to eat solid food, or speak, either. Francisca expressed her concerns to her local pediatrician, but her fears were brushed aside.

Adekanmi’s issues became so dire that in October 2010, he was brought to the emergency department at Mass General Hospital, where he was soon referred to Dr. Christopher Hartnick, Mass. Eye and Ear Director of Pediatric Otolaryngology.

After performing a direct laryngoscopy, Dr. Hartnick and his team immediately spotted the problem. They could see that Adekanmi’s tonsils and adenoids were so swollen that they were blocking his airway. Dr. Hartnick performed an immediate adenotonsillectomy — removal of the adenoids and tonsils that were preventing him from eating, and breathing normally.

After surgery, Adekanmi recovered in Mass General’s pediatric intensive care unit, where clinicians closely monitored his respiration and oxygen saturation, and watched closely for any other possible post-surgical complications.

Days after his operation, Adekanmi began eating solid food. Soon he was starting to speak. Today Adekanmi is doing well. “Now he sleeps with ease,” says Francisca. “He is making such good progress. He is so much happier — and making so much noise!” she says.
These percentages represent children undergoing tonsillectomy or tonsillectomy & adenoidectomy who then developed tonsil bleeding severe enough to require a return to the operating room (OR) for surgical treatment. The U.S. benchmark for OR intervention after these procedures is 1.3 - 3.3%.
The checklist offers many unprecedented benefits. Various providers felt that the checklist made the transfer more efficient as the questions were answered at the time of transfer, rather than through multiple messages and phone calls after the transfer had occurred. They also found the centralized location in the electronic medical record to be very helpful. An unforeseen benefit of the checklist being available electronically is its accessibility by the emergency department staff when discharged patients presented unexpectedly.

Errors in transfer of care are communication deficiencies that can have an adverse effect on a patient’s surgical recovery and overall health. Effective and clear communication that is understood by all providers translates to a decreased potential for inadvertent harm to patients. Hospitals have recognized that communication errors between providers are a major contributor to medical errors. We are always trying to find processes that can be improved. We recognized that our team’s communication when transferring care between providers could further be optimized so as to avoid possible errors in patient management.

From July 1, 2009 to October 1, 2009, a total of 33 pediatric airway patients sought coordinated care between MEEI and MGH pediatric intensive care units. Two critical respiratory emergencies occurred during this time period. Following these emergencies, a focus group was formed with the goal of improving postoperative information transfer so that future complications can be avoided. The checklist was implemented and over a 12 month observation period there were no adverse events related to the omission of key information during pediatric airway patient transfer (See Table 1).

Patients Observed Following Checklist Implementation
Coordinated Care Airway Patients of MEEI and Pediatric Intensive Care Unit over a 12 Month Period

- Patients with Airway Problems ................................................................. 93
- Nonsurgical Airway Patients ................................................................. 36
- Surgical Airway Patients ................................................................. 57
- Tracheotomy ..................................................................................... 17
- Laryngotracheal Reconstruction ................................................... 14
- Tracheoplasty .................................................................................. 5
- Tonsillectomy/Adenoidectomy for Severe OSA ......................... 10
- Juvenile Nasopharyngeal Angiofibroma Resection .............. 1
- Balloon Dilation for Subglottic Stenosis ..................................... 3
- Choanal Atresia Repair .................................................................. 3
- Tracheal Resection .......................................................................... 1
- Laryngeal Cleft Repair .................................................................. 2
- Tracheoesophageal Fistula Repair ................................................ 1
Between 2008 and 2010, adult cochlear implant patients were evaluated at Mass. Eye and Ear. All implant recipients included in this analysis initially presented with postlingual hearing loss and received post-implant speech perception testing more than five months after surgery. There were no permanent facial nerve injuries or cases of meningitis associated with cochlear implant surgery performed by full-time faculty at Mass. Eye and Ear.

The consonant-nucleus-consonant (CNC) test is used before and after implantation to assess word understanding through the perception of single syllable words in quiet. A higher score correlates with improved speech perception. Our data demonstrate CNC and phonemic word score improvement in adults of all ages with severe-to-profound acquired deafness. The benefits that our cochlear implant patients report after surgery include: 1) More effective oral communication at home and at work, 2) Ability to use the telephone, and 3) Overall improved quality of life.

**Otology**  
**Cochlear Implant Outcomes**

**Adult Cochlear Implant Outcomes 2008-2010**

The CNC test is used before and after implantation to assess word understanding through the perception of single syllable words in quiet. A higher score correlates with improved speech perception. Our data demonstrate CNC and phonemic word score improvement in adults of all ages with severe-to-profound acquired deafness. The benefits that our cochlear implant patients report after surgery include: 1) More effective oral communication at home and at work, 2) Ability to use the telephone, and 3) Overall improved quality of life.

**Total Patients (2008-2010)** ..................................................... 72

**Patients with Post-op Permanent Facial Nerve Injury** ......................... 0

**Patients with Post-op Transient Delayed Facial Nerve Weakness** .......... 1

CNC Test: During a consonant-nucleus-consonant test, an audiologist measures the patient’s ability to recognize a series of three-letter words such as “hat” and “car.” The CNC score represents the percentage of full words correctly recognized. The phonemic score is the percentage of phonemes, or parts of each word, correctly recognized.
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 the 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 Preoperative Air-Bone Gap

A patient with hearing thresholds of better than 20 decibels (dB) will report significant improvements in communication. In 2009, 97 patients underwent primary stapedectomy surgery. Of these patients, 98% showed hearing improvement. Table 1 shows the percentages of those 97 patients with closure of the preoperative air-bone gap to within 10dB or better and to within 20dB or better. There were no dead ears following stapedectomy surgery.
Head and Neck
Free Flap Reconstruction Outcomes

With increasing surgical volume and institutional experience, free flap reconstruction has transitioned from an extraordinary to an ordinary procedure. A ten-year study of free flap reconstruction from 1999 to 2009 shows that patients undergoing free flap reconstruction are increasingly older and have more medical issues that put them at higher risk for complication. However, despite these challenges, increased efficiency and teamwork stemming from accumulated institutional experience has lead to decreased operative times (see Table 4), shorter length of stay (see Table 4), a decline in complication rates (see Table 3), and increased overall success rates.

• Total operating room time was reduced from 12 hours to 9 hours through an emphasis on efficiency, standardization of equipment and procedures, and coordinated teamwork (Table 4).

• The incidence of free flap loss has been significantly reduced. Medical consultation has become part of the routine post-operative pathway for free flap patients, which may help limit medical complications (Table 3).

• We are still caring for patients with a wide assortment of cancer types (Table 2), but we have significantly improved the types of free flaps used to reconstruct the surgical deficits and have therefore greatly improved functional outcomes.

• Length of stay has been reduced from 14 to 9 days through the implementation of post-operative care pathways, with early intervention to ancillary services such as speech and swallow therapy, physical therapy, and case management (Table 4).

Table 1. Patient Characteristics (Demographic and Comorbidity)

<table>
<thead>
<tr>
<th></th>
<th>1999 (N = 39)</th>
<th>2009 (N = 81)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>58.4</td>
<td>61.4</td>
<td>.2</td>
</tr>
<tr>
<td>No. (%)</td>
<td>No. (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24 (61.5)</td>
<td>60 (74.1)</td>
<td>.202</td>
</tr>
<tr>
<td>Female</td>
<td>15 (38.5)</td>
<td>21 (25.9)</td>
<td></td>
</tr>
<tr>
<td>ASA 1</td>
<td>4 (10.2)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>ASA 2</td>
<td>30 (76.9)</td>
<td>51 (63.0)</td>
<td>.009</td>
</tr>
<tr>
<td>ASA 3</td>
<td>5 (12.8)</td>
<td>30 (37.0)</td>
<td>.009</td>
</tr>
<tr>
<td>Cardiac Disease</td>
<td>4 (9.8)</td>
<td>28 (34.6)</td>
<td>.0045</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2 (5.1)</td>
<td>9 (11.1)</td>
<td>.503</td>
</tr>
<tr>
<td>Prior Radiation</td>
<td>21 (53.8)</td>
<td>39 (48.1)</td>
<td>.697</td>
</tr>
</tbody>
</table>

Free flap reconstruction involves transplanting a piece of tissue (skin, muscle, and bone) and its blood supply to another part of the body. This surgical method is used to rebuild tissue that had to be surgically removed. The blood vessels are reconnected to blood vessels in the head and neck region or near the reconstructed site.
We are still caring for patients with a wide assortment of cancer types (Table 2), but we have significantly improved the types of free flaps used to reconstruct the surgical deficits and have therefore greatly improved functional outcomes.

The incidence of free flap loss has been significantly reduced. Medical consultation has become part of the routine post-operative pathway for free flap patients, which may help limit medical complications (Table 3).
Head and Neck
Free Flap Reconstruction Outcomes

Table 4. Comparison of Total OR Time, EBL, and Length of Stay

<table>
<thead>
<tr>
<th></th>
<th>Total OR Time (hours)</th>
<th>Estimated Blood Loss (cc's)</th>
<th>Length of Stay (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1999 (N = 39)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>12.24</td>
<td>472</td>
<td>19.87</td>
</tr>
<tr>
<td>Median</td>
<td>12</td>
<td>500</td>
<td>14</td>
</tr>
<tr>
<td>Range</td>
<td>7-20.5</td>
<td>200-1,250</td>
<td>6-140</td>
</tr>
<tr>
<td><strong>2009 (N = 81)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.98</td>
<td>370</td>
<td>10.79</td>
</tr>
<tr>
<td>Median</td>
<td>9</td>
<td>300</td>
<td>9</td>
</tr>
<tr>
<td>Range</td>
<td>5.5-12</td>
<td>100-1,800</td>
<td>6-50</td>
</tr>
<tr>
<td><strong>Mean Difference</strong></td>
<td>3.26</td>
<td>102</td>
<td>9.08</td>
</tr>
<tr>
<td>P Value</td>
<td>&lt; .001</td>
<td>.079</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Total operating room time was reduced from 12 hours to 9 hours through an emphasis on efficiency, standardization of equipment and procedures, and coordinated teamwork (Table 4).
Facial Nerve Outcomes
Platysmectomy

Hyperactivity of the platysma muscle in the neck is a common, bothersome condition related to aberrant regeneration of the facial nerve following an episode of facial paralysis. Patients may experience spasms or uncomfortable tension of this muscle. Patients who experience significant benefits following a trial of botox chemodenervation therapy may benefit from a more permanent intervention. The platysmectomy has demonstrated increased quality of life in patients suffering from platysmal hyperactivity due to facial paralysis.

The following statements from the FaCE survey are relevant to the platysmectomy procedure. Patients were asked to respond to the statements with one of five answers, "1. all of the time," "2. most of the time," "3. some of the time," "4. a little of the time," or "5. none of the time." Increasing scores represent an improvement in quality of life.

Question A. Parts of my face feel tight, worn out, or uncomfortable.
Question B. When I try to move my face, I feel tension, pain, or spasm.
Question C. My face feels tired, or when I try to move my face, I feel tension, pain, or spasm.

Improvement in FaCE Scores Following Platysmectomy

Note: Increasing scores represent an improvement in quality of life.
Thirteen patients completed both pre-intervention and post-intervention FaCE surveys for final analysis. Comparisons of pre-intervention and post-intervention FaCE scores in this age group rose from 51.3 to 65.7, demonstrating a significant improvement in overall patient quality of life following free gracilis transfer.

Facial Nerve Outcomes
Pediatric Gracilis Surgery

Free gracilis muscle transfer for facial reanimation is a surgical intervention that can benefit both adults and children who suffer from dense facial paralysis with no chance of spontaneous recovery. The procedure may offer these patients improved commissure excursion when smiling, which is a quality of life improvement for patients of all ages, but especially for those of the pediatric population.

Between October 2004 and September 2009, 23 patients under the age of 18 underwent free gracilis transfer surgery. Their muscle performance was quantified before and after the surgery using the validated SMILE program as an objective measure of functional outcome. The patients were also evaluated for quality of life using the FaCE instrument. Based on these measures, we concluded that pediatric patients respond equally favorably to free muscle transfer for facial reanimation as compared with adults, and their quality of life significantly improved following reanimations.

Pediatric Gracilis Surgery Outcomes:

- The average commissure excursion in children improved by 8mm. This matched the results seen in the adult population.
- The number of children with complete failures (<0.2 cm excursion) was fewer than those of the adult population (2 failures in pediatric population; 5 in adult population).

Improvement in FaCE scores Following Pediatric Gracilis Surgery
Voice Related Quality of Life (VRQoL) results are not specific for any one symptom (hoarseness, weakness of voice, inability to project, vocal fatigue) but reflect a patient-perceived improvement in the voice and the ability to communicate verbally. Quality of life is very difficult to measure since it is influenced by the social, emotional, financial, and personal circumstances that surround the patient and how they have changed over time. It can happen that a cancer patient may objectively sound worse after treatment but report major (statistically significant) improvements in VRQoL due to the ease of mind knowing the cancer is gone or the perception that the voice is better because the cancer is gone.

We find consistently lower VRQoL scores in laryngeal cancer patients than in professional singers who sound completely normal to everyone around them but are being seen for a tickle in the throat. The highest possible score is 100. Serious diseases have a way of forcing patients to prioritize what is truly important to them and to minimize the minor issues related to their healthcare.

<table>
<thead>
<tr>
<th>Phonomicrosurgery to Remove Vocal Fold Nodules, Polyps and Cysts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Pre-Op VRQoL</strong></td>
</tr>
<tr>
<td>48</td>
</tr>
</tbody>
</table>

An increase in VRQoL score indicates improvement in quality of life.

Vocal nodules, polyps and cysts cause symptoms by inhibiting the proper closure of the vocal folds during voicing. Typical symptoms associated with these lesions include hoarseness, vocal fatigue, loss of high notes and effortful voicing. Phonomicrosurgical removal of the lesion(s) after a trial of voice therapy that fails can restore vocal range, vocal quality and improve the effort of speaking. The VRQoL tool was used prior to surgery and compared to the results after surgery to measure the improvement in voice-related symptoms.
These are patients who come in complaining of vocal fatigue, lack of volume and unremitting hoarseness due to unilateral vocal fold paresis/paralysis or bilateral loss of vocal bulk due to the natural aging process (presbylarynx).

These are patients who require formal surgery to reconstruct the voice when there is a vocal fold paralysis/paresis or presbylarynx. These procedures are performed via a horizontal incision across the front part of the neck (two to four inches across) under local anesthesia so we can listen to how we are changing the voice.

The larynx is a supremely dynamic organ that represents the pinnacle of fine motor control in the animal kingdom. Our very lives depend on the function of the rich network of sensory and motor nerve fibers that keep us from aspirating food and drink into our lungs each time we eat. Voice is a byproduct of the way the system works, making the voice susceptible to nerve problems. Patients with vocal fold movement impairment, paresis (temporary or incomplete problems) or paralysis (permanent and complete loss of function), typically have complaints related to the inability to close the vocal folds during voicing such as breathy hoarseness, vocal fatigue, inability to project the voice, and the feeling of losing the breath while speaking or exercising. Treatment is directed at correcting the persistent gap by either supporting the weak vocal fold through an awake clinic injection technique (Injection Laryngoplasty) or manipulating the cartilaginous laryngeal framework in the operating room through a neck incision (Open Medialization Laryngoplasty).
The Thyroid Division is focused on the management of thyroid disorders including surgical management of thyroid cancer and its recurrence. Revision thyroid and neck surgery for thyroid cancer is typically associated with increased risks to the recurrent laryngeal nerve. Our center has focused on state-of-the-art recurrent laryngeal nerve monitoring to optimize management of this nerve during thyroid surgery.

**Thyroidectomy/Parathyroidectomy: Recurring Laryngeal Nerve Injury**

We reviewed our experience from 2004 to 2009 in 117 patients undergoing revision neck surgery at Mass. Eye and Ear for thyroid cancer. In 70% of patients our surgery was their first revision, in 21.4% of patients our surgery was their second revision surgery and in 5.1% of patients our surgery was their third revision surgery. In 0.8% of patients our surgery was their fourth, fifth, sixth or seventh revision surgery (see Table 1).

**Table 1. Time from Primary to Last Revision Surgery**

<table>
<thead>
<tr>
<th>Years</th>
<th>1st Revision</th>
<th>2nd Revision</th>
<th>3rd Revision</th>
<th>4th Revision</th>
<th>5th Revision</th>
<th>6th Revision</th>
<th>7th Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

In this study, we observed the following outcomes:

- The average duration of revision surgery was 152 minutes (range: 65-383 min).
- The average estimated blood loss for revision surgery was 40mLs (range: 15-100 mLs).
- There were no cases of new vocal cord paralysis following surgery, temporary or permanent.
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.
The department provides:

- Board certified radiologists with additional American Board of Radiology certificate of added qualification;

- Radiologists with experience built upon unique patient populations and constant exposure to routine and rare diseases;

- Constant surgical follow-up with verification of findings, considered to be one of the most effective methods of maintenance and improvement of imaging skills;

- Greater familiarity with the anatomy and variations of pathology than would be possible in less specialized institutions;

- Ease of access to audiology, otopathology and temporal bone laboratories to facilitate the clarification of complex anatomic points;

- Imaging at the leading-edge of technology, allowing definition of subtle extensions of disease to achieve the best results for patients.

Consistent with continuous quality improvement efforts at Mass. Eye and Ear, the Radiology Department has begun to formally measure extravasation rates in CT and MRI on an annual basis relative to contrast administration, as well as reporting on call back time for emergency wet reads. We expect timely reporting of these data in Mass. Eye and Ear's next Quality and Outcomes edition.
The Department of Nursing at Mass. Eye and Ear is a service-oriented department providing compassionate, safe, quality nursing care to our patients. The Nursing Department 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. Care is delivered within a tangible framework of care, compassion, and respect for the dignity of the patient and family and/or significant other. The ultimate goal of Mass. Eye and Ear nursing care is to restore the patient to the optimal level of health and provide as much comfort as possible. We recognize that this is a continuous process requiring a collaborative effort of all members of the healthcare team.

Nursing care is planned by a professional nurse according to the professional nursing standards and is based on the patient’s chronological age and developmental needs. Patient centered nursing care is used as the department’s model of care, with the ultimate goal of restoring patients to their optimal levels of health and comfort. Mass. Eye and Ear is dedicated to providing high-quality patient care to adult and pediatric patients based on the patient’s needs.
Staffing Effectiveness and Staffing Plans

The Chief Nursing Officer, with input from nursing leadership, ensures that there is professional and ancillary staff to provide safe, quality care to our patients. Mass. Eye and Ear is committed to positive patient outcomes, patient safety, and a high level of patient satisfaction. A staffing plan for each patient care area is developed by the nurse manager, and outlining the number and skill mix of staff required to provide for patients’ individualized needs and for quality and patient safety.

Clinical indicators have been identified to evaluate and assess staffing effectiveness at Mass. Eye and Ear. This supports the objective of providing an adequate skill mix and a sufficient number of competent staff by evaluating the information which links staffing effectiveness to clinical outcomes. Once data on the identified clinical indicators is collected and analyzed, root causes are identified for possible correlations that require action to ensure quality care, patient safety, and a high level of patient satisfaction.

Outcomes

The Department of Nursing’s outcome measures are aligned with the organization’s Quality Plan and demonstrate the impact specialty nurses have on patient care and outcomes. In choosing measures, the following questions were considered:

- **What is the value of this measure?**
- **Why would a patient care about this measure?**
- **What does the result of this measure do for patient care?**

This section summarizes some of our department’s many initiatives to transform and improve nursing care and outcomes for our patients.
Nursing Outcome Measure:

Practice Environment Scale (PES)
This measure was chosen because the nursing care environment has been linked to patient satisfaction and patient outcomes. A rating scale of 1-4 was utilized to measure the nursing practice environment (4 being most favorable and 1 being least favorable).

The PES is a nurse sensitive measure endorsed by the National Quality Forum and represents how our nurses feel regarding the quality of care they deliver, the resources they have to do their jobs, and their nurse-physician relationships.

Eligibility to complete the survey included:
- Registered nurse with minimum of three months of employment at Mass. Eye and Ear (no travelers or agency)
- 50% of job scope is clinical care

Our nurses’ response rate for the survey was:
- 2007 - 86%
- 2008 - 89%
- 2009 - 91%
- 2010 - 91%

The areas of focus for this report are:

Nursing Foundations for Quality of Care, this includes:
- Continuity of nurse’s patient care assignments
- High standards of nursing care
- Active Nursing Quality program
- Clinically competent nurses

Adequate Resources, this includes:
- Adequate support services
- R.N. to patient ratio based on patient needs

Collegial Nurse-Physician Relations, this includes:
- Good working relationships between R.N.s and M.D.s
- Collaboration between R.N.s and M.D.s
Service Excellence-Nursing
Patient Satisfaction-Inpatient: Skill of the Nurses

Mean 89.5
Patient Satisfaction-Ambulatory Surgery: Instructions Regarding Home Care

11th Floor Adult Unit
Falls Data 2008-2011

Having a surgical procedure combined with sensory deprivation can increase a patient’s risk of falling. The objective of the 11th Floor Adult Nursing Unit’s Quality Plan is to provide our patients with safe patient care. Inspired by this commitment, the Department of Nursing incorporated purposeful rounding into the daily routine of the staff in 2009 with the aim to reduce falls.

Fall prevention remains a priority and a quality goal on the Adult Unit.
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- Gregory W. Randolph, M.D., 617-573-4115

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- David Lesnik, M.D.
- David E. Nash, M.D.
- Michael B. Rho, M.D.

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- Paul M. Konowitz, M.D.
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- Edward J. Reardon, M.D.

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