Pediatric Institute & Children’s Hospital

2011 Outcomes

Children’s Hospital
Cleveland Clinic
To promote quality improvement, Cleveland Clinic has created a series of Outcomes books similar to this one for many of its institutes. Designed for a physician audience, the Outcomes books contain a summary of our surgical and medical trends and approaches, data on patient volumes and outcomes, and a review of new technologies and innovations.

Although we are unable to report all outcomes for all treatments provided at Cleveland Clinic — omission of outcomes for a particular treatment does not necessarily mean we do not offer that treatment — our goal is to increase outcomes reporting each year. When outcomes for a specific treatment are unavailable, we often report process measures associated with improved outcomes. When process measures are unavailable, we may report volume measures; a volume/outcome relationship has been demonstrated for many treatments, particularly those involving surgical techniques.

In addition to our internal efforts to measure clinical quality, Cleveland Clinic supports transparent public reporting of healthcare quality data and participates in the following public reporting initiatives:

- Joint Commission Performance Measurement Initiative (qualitycheck.org)
- Centers for Medicare & Medicaid Services (CMS) Hospital Compare (hospitalcompare.hhs.gov)
- Ohio Department of Health (ohiohospitalcompare.ohio.gov)
- Cleveland Clinic Quality Performance Report (clevelandclinic.org/QPR)

Our commitment to providing accurate, timely information about patient care also will help patients and referring physicians make informed healthcare decisions.

We hope you find these data valuable, and we invite your feedback. Please send comments and suggestions to us at OutcomesBookFeedback@ccf.org. To view all our Outcomes books, please visit Cleveland Clinic’s Quality and Patient Safety website at clevelandclinic.org/outcomes.
Dear Colleague:

Welcome to Cleveland Clinic’s 2011 Outcomes books. They include data on clinical outcomes, patient volumes, innovations and publications. Cleveland Clinic pioneered the collection and annual publication of outcomes data. This initiative has become part of the national discussion on lowering costs and improving the quality of healthcare.

Cleveland Clinic uses data to manage outcomes across the full continuum of care. Clinical services are delivered through patient-centered institutes, each based around a single disease or organ system. Institutes combine medical and surgical services, along with research and education, under unified leadership. Each institute defines quality benchmarks for its specialty services and reports longitudinal progress.

Cleveland Clinic Outcomes books are available in print and online. Additional data is available through our online Quality Performance Report (clevelandclinic.org/QPR). The site offers data in advance of national and state public reporting sites in key areas, including heart attack, heart failure, stroke and infection prevention.

We hope you will find this information useful.

Sincerely,

Delos M. Cosgrove, MD
CEO and President
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Prefer an e-version?
Visit clevelandclinic.org/OutcomesOnline, and we’ll remove you from the hard copy mailing list and email you when next year’s books are online.
Dear Colleague:

I am pleased to present the 2011 Cleveland Clinic Pediatric Institute & Children’s Hospital Outcomes book.

Last year, we ranked in all 10 pediatric subspecialties in the *U.S. News & World Report* survey of America’s Best Children's Hospitals. In addition, we:

- Implanted our second Berlin Heart®, a pediatric biventricular assist device allowing children to remain mobile during the often lengthy wait for a donor heart.
- Were invited to take part in an international trial on newborn resuscitation, thanks to the reputation of our Neonatology Department in the international community.
- Launched a groundbreaking study on autism spectrum disorder as Cleveland Clinic’s Center for Autism and the Genomic Medicine Institute began collaborating on a cheek-swab test for potential genetic markers.
- Participated in The Ohio Children's Hospital Solutions for Patient Safety Collaborative, a statewide initiative leading to a collective 60 percent reduction in surgical site infections and a 34.5 percent reduction in adverse drug events.

Last year also saw the opening of key facilities, including our:

- Special Delivery Unit, which streamlines delivery and immediate newborn management for serious fetal and maternal conditions. A large labor and delivery suite and OR can accommodate a team of specialists.
- Hybrid Pediatric Cardiac Catheterization Laboratory, adjoining the unit to provide lifesaving catheter-based treatment combined with surgical treatment for newborns with complex congenital heart disease. Both children and adults can benefit from the lab’s advanced imaging technology that reduces radiation output and enhances accuracy.
In 2011, we also increased the number of beds in our Level III neonatal intensive care units to 87 systemwide. Our pediatric neurosurgery program grew to become Ohio’s largest, with three full-time surgeons. Our Pediatric Hematopoietic and Stem Cell Transplant Program continued to flourish.

Last year, we also welcomed pediatric specialists in cardiology, gastroenterology, nephrology, neonatology, pain management, plastic surgery and rheumatology, as well as community pediatricians.

Three Cleveland Clinic community facilities opening last year in Twinsburg, East Cleveland, and Avon, Ohio, allowed us to offer nationally ranked pediatric specialty care closer to home for families in the region.

We hope you find the enclosed information useful and look forward to collaborating with you to deliver outstanding pediatric care in the years to come.

Sincerely,
Ricardo J. Rodriguez, MD
Interim Chair, Pediatric Institute & Children’s Hospital
Chair, Department of Neonatology
Cleveland Clinic Children's Hospital has provided world-class, family-centered care to infants, children, adolescents and families since 1921. More than 300 pediatric specialists and subspecialists within our Children’s Hospital provide state-of-the-art care for complex medical problems. Our pediatric specialists join more than 60 community pediatricians in providing primary and specialty care at family health centers across Northeast Ohio. We have dedicated pediatric emergency departments, neonatal intensive care units and pediatric specialty clinics at Cleveland Clinic community hospitals as well.

Children's Hospital pediatricians and specialists provide the full spectrum of primary, specialty and subspecialty care. Key programs are highlighted below:

**Pediatric Anesthesia**

Our large, dedicated Children's Hospital team of pediatric anesthesiologists managed more than 7,800 cases in 2011, including 600 pediatric open heart surgeries and cardiac catheterization procedures.

**Pediatric and Congenital Heart Diseases**

In 2011, our heart surgeons performed 210 congenital heart disease operations, including complex cases referred from around the world. Their surgical innovations address the unique needs of these infants and children throughout childhood, adolescence and adulthood. Our pediatric cardiologists are experts in interventional catheterization procedures, including percutaneous valve insertions, and are able to use covered stents when needed. They are actively developing and testing less invasive techniques and new devices, and are among the first to implant an MRI-safe pacemaker in a child. The new “hybrid” Pediatric Cardiac Catheterization Laboratory allows our surgeons and cardiologists to collaborate on combined surgical and catheter-based treatments. The lab’s advanced imaging reduces radiation output, improving both the safety and accuracy of treatment.
Pediatric Critical Care Medicine

Fixed-wing Pediatric Critical Care Transport allows us to fly infants, children and adolescents to our Children's Hospital from around the country and across the globe. Board-certified intensivists provide 24/7 coverage in our 25-bed Pediatric Intensive Care Unit (PICU), which has excellent outcomes. Our unit's 2011 Pediatric Index of Mortality (PIM2) of 0.48 was well below the national standard of 0.9 for general mixed PICUs. We also maintained a catheter-associated bloodstream infection rate of 2.9 per 1,000 patient days (below the NACHRI collaborative rate of 3 per 1,000 catheter days) and a catheter-associated urinary tract infection rate of 2.9 per 1,000 Foley days. No ventilator-associated pneumonia or nosocomial viral infections have occurred in more than five years in our PICU.

Pediatric Digestive Disease

Our 11 Children's Hospital pediatric gastroenterologists offer evaluation and treatment for gastrointestinal and liver disorders and have one of the nation's largest pediatric inflammatory bowel disease (IBD) centers. Our medical and surgical digestive disease team is one of the few capable of performing multi-organ transplants, including pancreas, liver and bowel transplants. We also offer living-related, reduced-size and split-graft liver transplantation. A dedicated pediatric endoscopy suite is equipped with streamlined detection technology, including capsule endoscopy, and with high-definition endoscopes that offer an unparalleled view of the digestive tract. We offer state-of-the-art, high-resolution motility testing for pediatric patients of all ages. Our digestive disease specialists are committed to research ranging from collaborative basic science research on fatty liver disease and childhood obesity to the need to check hepatitis B immunity before starting children on biologic therapy for IBD.

Pediatric and Adolescent Endocrinology

Children's Hospital endocrinologists provide state-of-the-art care to more than 6,000 children annually. Our Diabetes Clinic follows more than 800 children with diabetes, and over 65 percent of these children use insulin pumps. We offer continuous glucose monitoring services to help us manage children's glucose levels 24 hours per day. We evaluate and manage children with disorders of growth, puberty, the thyroid gland and the adrenal gland. We also manage adolescent girls with polycystic ovary syndrome and other menstrual irregularities. We are studying shared medical appointments for adolescents and toddlers with Type 1 diabetes to see if they result in improved glycemic control.

Pediatric Epilepsy and Neurology

Children's Hospital neurologists and neurosurgeons are recognized for the state-of-the-art care that they provide to more than 11,500 children annually. Our epilepsy specialists see more than 1,700 children each year. A new nine-room Pediatric Epilepsy Monitoring Unit annually records activities for more than 550 children with uncontrolled seizures; each year, more than 100 of them undergo surgery with 3-D mapping employed to pinpoint seizure foci. Our pediatric neurosurgeons are also experienced in brain tumor surgery, craniofacial procedures involving the skull, and surgery to relieve hydrocephalus and spasticity. They have helped to refine neuroendoscopy, a technique for navigating the ventricles in the brain.
Pediatric Hospital Medicine

Our pediatric hospitalists oversee children's inpatient care at our main campus Children's Hospital, Cleveland Clinic Children's Hospital for Rehabilitation, and Hillcrest and Fairview community hospitals. Innovative "family-centered rounds" involve parents in daily bedside discussions with specialists, residents and nurses as they coordinate each child's care plan.

Neonatology

Children's Hospital neonatologists oversee a total of 87 beds at Level III NICUs in our main campus, Hillcrest and Fairview hospitals. They collaborate with high-risk obstetricians, fetal MRI specialists, pediatric surgeons and other specialists in Cleveland Clinic's Fetal Care Center. This center streamlines the diagnosis and management of fetal anomalies. Key components of the center are the new Special Delivery Unit (SDU) and Pediatric Cardiac Catheterization Laboratory. The SDU features a labor and delivery suite, an OR for Cesarean sections, and an advanced newborn resuscitation and treatment room. Our neonatologists also collaborate with neonatal neurologists, pediatric neurosurgeons, neuroradiologists and epilepsy specialists in the first dedicated neonatal neuro-intensive care program in the region. Neurally adjusted ventilatory assist is available to manage respiratory failure in critically ill infants.

Pediatric Oncology

Our pediatric oncologists participate in the Children's Oncology Group and other national study groups to give children with leukemia, lymphoma, sarcoma, brain tumors and rare cancers access to more than 100 national pediatric trial protocols. These regimens are designed to optimize young patients' chances of cure while decreasing long-term treatment side effects. Promising bone marrow transplant (BMT) protocols are being studied in our new Pediatric Hematopoietic and Stem Cell Transplant Program, where autologous, allogeneic and cord-blood transplants are offered. Basic research is also being conducted on genetic markers to improve donor selection in pediatric BMT. We have a five-year, $1.2 million NIH grant to support preclinical analysis of cancer vaccines derived from malignant brain tumor cells.

Pediatric Palliative Care

To help bereaved families in our Children's Hospital, our Pediatric Palliative Care Program staff has developed the Compassionate Hearts Program. Through the program, we maintain contact with families for 12 to 24 months so that they can take advantage of support and resources when they are ready.
**Pediatric Rheumatology**

The Center for Pediatric Rheumatology provides access to cutting-edge, comprehensive therapy for children and families dealing with chronic rheumatologic conditions. In 2011, our rheumatologists treated more than 250 children with juvenile idiopathic arthritis (JIA) and participated in six clinical JIA trials. We also invited JIA patients and families to attend innovative shared medical appointments to share their knowledge and experience with other families in a supportive group setting. Our center also remains a national referral center for children with all forms of chronic vasculitis. In 2011, we saw more than 20 new patients with these life-threatening conditions and conducted therapeutic, genetic and outcomes-based research in this unique patient population. We also provide care for children with rare autoinflammatory syndromes, uveitis and autoimmune encephalitis.

**Pediatric Surgery**

This department’s four board-certified pediatric surgeons are experienced in treating congenital structural anomalies in infants, complex gastrointestinal diseases in children of all ages, pediatric chest and abdominal tumors, and chest wall deformities of all types. They also treat common conditions such as pediatric hernias, undescended testes and appendicitis. Patients range in age from newborns to young adults, and emphasis is placed on emerging surgical techniques that minimize surgical trauma for children, such as minimally invasive surgery and single-port procedures. With state-of-the-art, high-definition surgical imaging in our renovated pediatric ORs, these technologies can be applied to the smallest of patients. Our surgeons and two full-time pediatric nurse practitioners provide inpatient consultative and surgical services at our main campus, and 24/7 coverage of the ERs, Level III NICUs and pediatric wards at Hillcrest and Fairview community hospitals. There, and at Cleveland Clinic's new Twinsburg Family Health and Surgery Center, our surgeons also offer a full spectrum of outpatient procedures.

**Child Life Services**

The members of our Child Life Department recognize that hospitalization and illness can be stressful and frightening for both children and families. Our Child Life Specialists work alongside medical staff to help children and families understand and manage the healthcare experience. They have either a bachelor’s or master’s degree in human growth and development, education, psychology or a related field. All Certified Child Life Specialists must complete a supervised 480-hour clinical internship, pass an examination, and adhere to the code of ethics and standards of the Child Life Council, the national organization in charge of credentialing.
Pediatric Rehabilitation

Cleveland Clinic Children’s Hospital for Rehabilitation (CCCHR) is one of 13 accredited, freestanding pediatric rehabilitation hospitals in the United States. At this hospital, we offer comprehensive rehabilitation for children recovering from trauma, surgery, or a complex medical or surgical acute care stay due to traumatic brain injury, spinal cord injury, stroke or a complex seizure disorder. We also provide post-NICU rehabilitation. Children with chronic illnesses are also treated at our hospital, which offers a full range of inpatient and outpatient physical, occupational and recreational therapy, and speech/language pathology. We also have a unique Feeding Disorders Program, and the following programs:

- **The ADHD Center for Evaluation and Treatment.** With its innovative Medical Monitoring Program and successful Summer Treatment Program, this center helps children with ADHD experience success in school and social settings.

- **Cleveland Clinic Center for Autism.** This center, housed in the Debra Ann November Wing of the Children’s Hospital for Rehabilitation, is dedicated to the diagnosis and evidence-based treatment of autism spectrum disorder (ASD) and works with children and families. The Lerner School for Autism provides a year-round, state-of-the-art learning environment for students aged 2 to 22. Our specialists use a unique vocational training program to help the growing number of adolescent students with ASD transition to adulthood. The center’s research director has received an NIH training grant to identify and characterize the effects of genetic changes leading to autism.

- **The Pediatric Pain Rehabilitation Program.** This is the first and only pediatric pain rehabilitation program in the world to be accredited by the Commission on Accreditation of Rehabilitation Facilities (CARF). Our program is geared to children whose chronic pain affects school attendance and limits everyday activities. It is an intensive, three-week inpatient and one-week outpatient program. A multidisciplinary team provides individualized care focused on both the child and family for lasting success.
Pediatric Transplantation

Cleveland Clinic Children’s Hospital is the only comprehensive pediatric transplant center in Northern Ohio offering heart, liver, lung, pancreas and kidney transplantation for patients from infancy through young adulthood. We also offer a small bowel transplant program to help children with intestinal failure.

- **Pediatric hematopoietic stem cell transplant.** Established in 2010, this program brings the latest treatments and protocols to young patients whose only chance for cure is stem cell transplantation. Clinical research will aim to optimize donor selection and conditioning, while basic research will focus on a new genetic marker to improve donor selection.

- **Heart transplant.** Our success rate for heart transplant is consistently higher than the national average, and we are one of a select number of centers worldwide to have performed more than 100 pediatric heart transplants. We offer young patients awaiting donor hearts life-saving “bridge” treatment with mechanical hearts, including the Berlin Heart® ventricular assist device. Our Children’s Hospital also participated in a 10-year NIH program to develop an artificial heart small enough for infants.

- **Liver transplant.** Our pediatric liver transplant team is one of the most experienced in the nation, offering live-donor, split-graft and deceased-donor transplants as well as multi-organ grafts.

- **Kidney transplant.** Our Kidney Transplant Center has more experience with kidney transplantation than any other program in Northeast Ohio, and is affiliated with the dedicated Pediatric Dialysis Unit at our Shaker Campus.

Pediatric Residency and Fellowship Training

Cleveland Clinic Children’s Hospital offers traditional Pediatrics residencies as well as a combined Pediatrics/Pediatric Neurology program and preliminary pediatric transitional training in Pediatric Dermatology. Our robust pediatric training program also includes fellowships in Allergy & Immunology, Neonatology, Pediatric Anesthesiology, Pediatric Cardiology, Pediatric Clinical Research, Pediatric Gastroenterology, Pediatric Hematology/Oncology, Pediatric Infectious Diseases, Pediatric Ophthalmology and Adult Strabismus, Pediatric Orthopaedic Surgery, Pediatric and Specialty Clinical Child Psychology, and Pediatric Rheumatology. Physician sponsors and mentors offer clinical support, and two full-time coordinators and a full-time manager administer the programs.
# Institute Overview

## Outpatient Visits

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergy</td>
<td>6,174</td>
</tr>
<tr>
<td>Behavioral Health</td>
<td>9,649</td>
</tr>
<tr>
<td>Cancer Center</td>
<td>5,270</td>
</tr>
<tr>
<td>Dermatology</td>
<td>14,112</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>8,626</td>
</tr>
<tr>
<td>EMI Bariatric Surgery</td>
<td>227</td>
</tr>
<tr>
<td>Express Clinic</td>
<td>2,988</td>
</tr>
<tr>
<td>Endocrinology</td>
<td>8,875</td>
</tr>
<tr>
<td>Fetal Care / Developmental Follow-up</td>
<td>817</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>13,455</td>
</tr>
<tr>
<td>General Pediatrics</td>
<td>342,910</td>
</tr>
<tr>
<td>Head and Neck</td>
<td>16,556</td>
</tr>
<tr>
<td>Heart Center</td>
<td>11,385</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>799</td>
</tr>
<tr>
<td>Medical Genetics</td>
<td>719</td>
</tr>
<tr>
<td>Nephrology</td>
<td>2,952</td>
</tr>
<tr>
<td>Neurosciences</td>
<td>25,689</td>
</tr>
<tr>
<td>Obstetrics &amp; Gynecology</td>
<td>26,694</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>29,199</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>50,828</td>
</tr>
<tr>
<td>Pain Management</td>
<td>696</td>
</tr>
<tr>
<td>Pediatric Rehabilitation</td>
<td>1,520</td>
</tr>
<tr>
<td>Physical, Occupational and Speech Therapy</td>
<td>38,876</td>
</tr>
<tr>
<td>Pulmonary Medicine</td>
<td>3,772</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>3,426</td>
</tr>
<tr>
<td>Surgery</td>
<td>8,689</td>
</tr>
<tr>
<td>Urology</td>
<td>2,614</td>
</tr>
<tr>
<td><strong>Total Outpatient Visits</strong></td>
<td><strong>637,517</strong></td>
</tr>
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</table>

Outcomes 2011
<table>
<thead>
<tr>
<th><strong>Surgical Cases</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>General Surgery</td>
<td>1,595</td>
</tr>
<tr>
<td>Cardiothoracic Surgery</td>
<td>210</td>
</tr>
<tr>
<td><strong>Total Cases</strong></td>
<td><strong>1,805</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Pediatric Cardiology</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Catheterization Procedures</td>
<td>441</td>
</tr>
<tr>
<td>Pediatric Echocardiograms</td>
<td>6,233</td>
</tr>
<tr>
<td><strong>Total Cases</strong></td>
<td><strong>6,674</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Pediatric Gastroenterology</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Endoscopy</td>
<td>954</td>
</tr>
<tr>
<td>Other Diagnostic Procedures</td>
<td>1,053</td>
</tr>
<tr>
<td><strong>Total Cases</strong></td>
<td><strong>2,007</strong></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Patient Days</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>42,369</td>
</tr>
<tr>
<td>NICU</td>
<td>20,138</td>
</tr>
<tr>
<td>PICU</td>
<td>4,681</td>
</tr>
<tr>
<td><strong>Total Days</strong></td>
<td><strong>67,188</strong></td>
</tr>
</tbody>
</table>
Cardiac Catheterization and Intervention

In 2011, Cleveland Clinic Children’s Hospital’s Center for Pediatric and Adult Congenital Heart Disease opened a new, state-of-the-art catheterization laboratory. New technologies, including three-dimensional rotational angiography, allow detailed evaluation of three-dimensional anatomy, facilitating complex interventions. Additionally, improved imaging is achieved with the potential of lower radiation exposure. The design of the new laboratory makes it possible to perform hybrid procedures, combining the expertise of the interventional cardiologist and the congenital cardiac surgeon. A new Special Delivery Unit located adjacent to the catheterization laboratory allows immediate catheter intervention for critically ill newborns, improving the safety of the procedure and eliminating the need for transfer to another area of the hospital. A new, three-bed post-anesthesia care unit, also situated adjacent to the catheterization laboratory, improves continuity of care for patients following catheterization and allows faster turnover between cases.

The transcatheter pulmonary valve program continues to grow, and results have been excellent. In the past year, nine patients underwent implantation of this valve, with no serious complications. The transcatheter pulmonary valve functioned well, with no more than mild obstruction or leak immediately following the procedure or at almost two year’s follow-up.

Pediatric Catheterization by Age
2008 – 2011

Number of Cases

<table>
<thead>
<tr>
<th>Age</th>
<th>2008 (N = 435)</th>
<th>2009 (N = 495)</th>
<th>2010 (N = 507)</th>
<th>2011 (N = 488)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 28 Days</td>
<td>50</td>
<td>50</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>&gt; 28 Days to 1 Year</td>
<td>150</td>
<td>150</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>&gt; 1 Year</td>
<td>250</td>
<td>250</td>
<td>260</td>
<td>260</td>
</tr>
</tbody>
</table>
Catheterization by Type
2008 – 2011

Number of Catheterizations

- Diagnostic
- Therapeutic
- Electrophysiologic

Pediatric Interventional Catheterization by Type (N = 398)
2011

Number of Procedures

*ASD = atrial septic defect, PFO = patent foramen ovale, PDA = patent ductus arteriosus
Despite performing a large number of catheterizations and numerous complex procedures, the Center for Pediatric and Congenital Heart Disease continues to have a low complication rate. In 2011, the center was one of a few in the country to join the Improving Pediatric and Adult Congenital Treatment Registry (IMPACT Registry®), which is sponsored by the American College of Cardiology Foundation. The registry will allow the center to assess catheterization outcomes for pediatric and adult patients with congenital heart disease in a more systematic manner.

The heart disease center also added a new electrophysiologist to the staff in 2011. This has enabled the center to expand its services to include pacemaker implants, generator changes and implantable cardioverter defibrillator implants, in addition to electrophysiologic studies and ablations.

**Pediatric Catheterization Complication Rate**

**2008 – 2011**

<table>
<thead>
<tr>
<th>Percent</th>
<th>Minor*</th>
<th>Major†</th>
<th>Mortality‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Minor complications include minor hematomas, bruises and minor rashes.
†Major complications include surgical intervention, unanticipated ICU admission, unanticipated intubation, death, stroke and CPR.
‡Mortality was zero for 2008, 2009, 2010 and 2011.
Pediatric Echocardiography and Outpatient Services

In 2011, the Center for Pediatric and Adult Congenital Heart Disease saw continuous growth in its outreach cardiology clinics and in the services that they provide. Overall, there was a 26 percent increase in patient visits, with a 48 percent increase in noninvasive lab services (echocardiogram, electrocardiogram and Holter monitoring). The main campus also continues to have a steady stream of patients and services.

The pediatric cardiac echocardiography lab has teamed with Cuyahoga Community College to train prospective cardiac sonographers in pediatric and congenital heart echocardiography. One student per year who shows interest in and has taken the required courses will be assigned to the lab, and will be trained by one of 10 trained sonographers.

Pediatric Outpatient Encounters

Number of Encounters

<table>
<thead>
<tr>
<th>Year</th>
<th>Outreach visits</th>
<th>Outreach-NIL* studies</th>
<th>Total clinic visits</th>
<th>Total NIL studies</th>
<th>Total encounters</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>260</td>
<td>290</td>
<td>365</td>
<td>353</td>
<td>391</td>
</tr>
<tr>
<td>2006</td>
<td>290</td>
<td>290</td>
<td>365</td>
<td>353</td>
<td>391</td>
</tr>
<tr>
<td>2007</td>
<td>365</td>
<td>365</td>
<td>365</td>
<td>353</td>
<td>391</td>
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<tr>
<td>2008</td>
<td>353</td>
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<td>2009</td>
<td>353</td>
<td>353</td>
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<td>353</td>
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<tr>
<td>2010</td>
<td>353</td>
<td>353</td>
<td>353</td>
<td>353</td>
<td>353</td>
</tr>
<tr>
<td>2011</td>
<td>391</td>
<td>391</td>
<td>391</td>
<td>391</td>
<td>391</td>
</tr>
</tbody>
</table>

*Noninvasive laboratory

Fetal Echocardiography Volume

Number of Fetal Echocardiograms

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Fetal Echocardiograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>260</td>
</tr>
<tr>
<td>2008</td>
<td>290</td>
</tr>
<tr>
<td>2009</td>
<td>365</td>
</tr>
<tr>
<td>2010</td>
<td>353</td>
</tr>
<tr>
<td>2011</td>
<td>391</td>
</tr>
</tbody>
</table>
Regional Expansion

The center added two new outreach programs in 2011, one in Canton, Ohio, and another in Twinsburg, Ohio. It also hired two additional dedicated pediatric cardiac sonographers. From 2010 to 2011, the number of outpatients seen in our outreach clinics increased by 26 percent, from 2,302 to 2,898.

Pediatric Cardiology Regional Expansion

Number of Outreach Clinics

<table>
<thead>
<tr>
<th>Year</th>
<th>Clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>7</td>
</tr>
<tr>
<td>2007</td>
<td>7</td>
</tr>
<tr>
<td>2008</td>
<td>9</td>
</tr>
<tr>
<td>2009</td>
<td>11</td>
</tr>
<tr>
<td>2010</td>
<td>16</td>
</tr>
<tr>
<td>2011</td>
<td>17</td>
</tr>
</tbody>
</table>

Pediatric Cardiology Regional Expansion

Outreach Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Outreach visits</th>
<th>Outreach-NIL* studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1,115</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>1,435</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>2,654</td>
<td>1,034</td>
</tr>
<tr>
<td>2008</td>
<td>2,870</td>
<td>1,050</td>
</tr>
<tr>
<td>2009</td>
<td>4,313</td>
<td>2,580</td>
</tr>
<tr>
<td>2010</td>
<td>5,288</td>
<td>3,090</td>
</tr>
<tr>
<td>2011</td>
<td>6,930</td>
<td>4,000</td>
</tr>
</tbody>
</table>

*NIL = noninvasive laboratory
**Quality Initiatives**

The Center for Pediatric and Adult Congenital Heart Disease is one of 65 programs across the nation participating in the National Pediatric Cardiology Quality Improvement Collaborative (NPC-QIC). As the only participating center in Northeast Ohio, Cleveland Clinic’s heart disease center is committed to the collaborative’s goal of improving survival and reducing morbidity in patients with hypoplastic left heart syndrome (HLHS). NPC-QIC employs current quality improvement techniques, identifying best practices to meet that goal. The collaborative focuses on reducing hospital readmissions and improving the nutritional status of these critically ill neonates. Our center’s nurse practitioners have adapted many of these best practices to provide the same quality care for many other high-risk patient populations. This type of collaboration is crucial in our field; it enables accumulation of sufficient patient numbers for rare lesions, allowing meaningful outcomes data to be derived.

Since standardizing the care of HLHS patients and extending our experience to other neonates with complex congenital heart disease, the center has had a reduction in unexpected readmissions and admission for red-flag events. Our averages for these outcomes are better than the national average. Initial feedback from parents and other healthcare providers pertaining to the streamlined care of these fragile infants has been overwhelmingly positive.

Research has shown that children with congenital heart disease are at increased risk of neurological deficits. In 2011, a specialized pediatric neurocardiology program was developed to provide coordinated care across the life span of children with heart disease. Composed of specialists in cardiology, neurology, medical genetics, neuropsychology, nutrition, and physical and occupational therapy, this program has successfully streamlined a multidisciplinary approach to the care of children with heart disease who are at risk of neurodevelopmental deficits.

![Three-dimensional rotational angiography](image)

Three-dimensional rotational angiography in a patient with repaired Tetralogy of Fallot and pulmonary artery stenosis. This technology enables the cardiologist to view structures from any angle based on a single image acquisition. In addition to optimizing diagnostic and interventional techniques, this technology has the potential to help reduce overall radiation exposure, contrast load and time of complex catheterization procedures.
**Congenital Heart Disease**

About 1 in 120 babies born each year in the United States has a congenital heart defect. One million people in the United States have congenital heart disease. In some cases, the disease is life-threatening at birth. However, some cases are not discovered for years. Cleveland Clinic has expertise in the diagnosis and treatment of patients with all forms of congenital heart disease. The newly opened Special Delivery Unit allows patients diagnosed in-utero with complex heart conditions to receive immediate treatment after birth. The department is focused on achieving excellent outcomes in a family-centered care setting.

**Adult Congenital Heart Disease Volumez**

**2011**

The Adult Congenital Heart Disease Center offers a collaborative approach to treatment. Cardiologists who specialize in pediatric care, adult care, intervention and cardiovascular surgery work together to create individual, expert treatment plans and care. In 2011, we saw 1,401 patients, including 460 new referrals.

**Percutaneous Interventional Procedures for Adult Congenital Heart Disease**

**Volume and Outcomes**

**2011**

A total of 214 adult patients with congenital heart disease received interventional treatment in 2011. Although many of these cases were complex, we achieved a 100 percent success rate and 0 percent mortality.

<table>
<thead>
<tr>
<th>Total Adult Congenital Heart Disease Patient Visits</th>
<th>1,401</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Referral Visits for Adult Congenital Heart Disease</td>
<td>460</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adult Congenital Cases</th>
<th>214</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex Congenital Cases</td>
<td>119</td>
</tr>
<tr>
<td>Complex Congenital Interventions</td>
<td>37</td>
</tr>
<tr>
<td>Success Rate</td>
<td>100%</td>
</tr>
<tr>
<td>30-Day Mortality</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Percutaneous Closure Procedures**

**Volume and Outcomes**

**2011**

In 2011, we performed 77 percutaneous closure procedures. The success rate was 99 percent with 0 percent mortality.

<table>
<thead>
<tr>
<th>Percutaneous ASD Closures</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percutaneous PFO Closures</td>
<td>52</td>
</tr>
<tr>
<td>Successful Repair*</td>
<td>99%</td>
</tr>
<tr>
<td>30-day Mortality</td>
<td>0%</td>
</tr>
<tr>
<td>Patients Requiring Repeat Procedure</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Based on one complication, including stroke, myocardial infarction and need for surgery.
Adult Congenital Heart Surgery Volume (N = 622)

2011

Cleveland Clinic’s Department of Congenital Heart Surgery offers a full range of comprehensive surgical treatments for adults with congenital defects. In 2011, our mortality rate was 0.2 percent, which is well below the expected rate for these procedures.

Pediatric Congenital Surgery Volume and Type (N = 135)

2011

In 2011, Cleveland Clinic surgeons performed 135 pediatric congenital surgeries of varying complexity. The procedures within the majority “other” category include coarctation repair, patent ductus arteriosus closure, truncus arteriosus repair, etc. We continue our commitment to innovation in heart failure and transplant care. In 2011, we successfully implanted three Berlin Heart EXCOR® ventricular assist devices (Berlin Heart GmbH, Berlin) as a bridge to transplant for children with life-threatening conditions.

Abbreviations: ASD, atrial septal defect; AV, atrioventricular; PDA, patent ductus arteriosus; TOF, tetralogy of Fallot; VSD, ventricular septal defect.
**Pediatric Congenital Heart Disease Mortality**

**2011**

In 2011, the rates of mortality for pediatric patients with congenital heart disease were lower than expected. We continue to strive for the lowest possible mortality rates for all patients.

![Bar chart showing Cleveland Clinic vs. Expected mortality rates for Pediatric (N = 135).](chart.png)

* University Health-System Consortium

**Repair of Sinus Venosus ASD with Anomalous Pulmonary Veins**

Cleveland Clinic surgeons have developed a new technique to treat patients with sinus venosus atrial septal defect with anomalous pulmonary veins. A total of 32 patients have undergone this procedure since 2000.
Treatment of a Coronary Fistula

Injection to the right coronary artery demonstrating bloodflow being diverted to a fistula that comes off just proximal to the opening of the coronary artery from the aorta and which drains to the pulmonary artery.

A guidewire is advanced into the fistula through a guide catheter.

A telescoping technique is used to maintain a stable position so the occlusion device can be safely deployed.

The Amplatzer Vascular Plug II™ (Arrow) is deployed in the fistula.

Within seconds, the fistula is occluded and no flow is seen beyond the device (Arrow).

After the intervention, reinjection of the right coronary artery demonstrates that flow remains normal in the right coronary artery and that bloodflow is no longer being diverted in the direction of the fistula.
**Three-Day Continuous Glucose Monitoring**

Cleveland Clinic’s Center for Pediatric and Adolescent Endocrinology continues to assess the impact of three-day continuous glucose monitoring on HbA1c levels in children and adolescents. In 2011, the endocrinology team decided to determine if there was a difference in monitoring’s impact between a group of 25 patients who use insulin pumps and another group of 24 patients who use multiple daily insulin injections. Our study found that both groups experienced a significant decrease in HbA1c level as a result of the three-day continuous glucose monitoring with the CGMS® iPro™ (Medtronic, Minneapolis). The greatest effects were seen in two groups: children older than 8 years of age and children who had higher initial HbA1c levels.

**Change in HbA1c Levels After Continuous Glucose Monitoring in Patients Using Insulin Pumps or Multiple Daily Insulin Injection (N = 49)**

Because our findings were so striking, we are now offering this service to more children and adolescents with type 1 diabetes mellitus. Three-day continuous glucose monitoring is also now used as a tool to evaluate children suspected of having hypoglycemia. The Center for Pediatric and Adolescent Endocrinology will continue to offer new technologies, as they develop, to help our patients manage their diabetes.
Cleveland Clinic offers a program for children and adolescents aged 7 to 16 years who are serious about wanting to lose weight. Specifically designed for children and their parents, Fit Youth brings families together for a 12-week comprehensive program. Group leaders include a psychologist, dietitian and exercise physiologist. Between meetings, the children are expected to keep a diary, listing all food that they eat and their physical activity. In addition to weight loss, the program helps the children develop new eating and exercise habits.

In 2011, 51 children and teenagers enrolled in Fit Youth sessions at Cleveland Clinic. Sessions were held at three family health centers: Beachwood, Independence and Strongsville. Funding for two other locations, the Westown Physician Center and the Stephanie Tubbs Jones Health Center, was provided by a generous grant from the Cleveland Cavaliers through its Youth Fund, which made the program free for families in the urban core.

Of the 51 Fit Youth participants, 45 completed the 12-week program. At the program’s completion, the median decrease in waist girth was 2.6 cm, and the median weight loss was 1.3 pounds, which is equivalent to a median decrease in BMI of 0.1 percentile. Eighty percent of these participants showed a decrease in BMI, 76 percent showed a decrease in BMI percentile, and 75 percent lost waist girth.

The data presented in these graphs represent the outcomes for Fit Youth participants enrolled only at Cleveland Clinic's Independence Family Health Center.

Median Reduction in Body Mass Index (BMI) of Independence Fit Youth Participants (N = 128)
Median Reduction in Weight of Independence Fit Youth Participants (N = 128)

Pounds


Median Reduction in Waist Circumference of Independence Fit Youth Participants (N = 128)

Centimeters

Pediatric Gastroenterology

Pediatric Ambulatory Endoscopy

In 2011, 631 pediatric patients aged 2 years or older underwent upper endoscopy, colonoscopy or both in the Pediatric Ambulatory Endoscopy Unit. All procedures were performed under general anesthesia, which was administered by a pediatric anesthesiologist.

Patient records were reviewed to identify adverse events that occurred at the time of or following endoscopic procedures, including hemodynamic instability, medication reactions, gastrointestinal bleeding or other procedural complications. Two patients were found to have had adverse events: the development of a duodenal hematoma in one and the onset of supraventricular tachycardia during the procedure in the other.

Patient medical records were also reviewed to identify postprocedural symptoms self-reported by patients within seven days of their procedure. In our group of patients, postprocedural symptoms were reported in 4 percent and included abdominal pain, chest pain, nausea, vomiting, diarrhea, fever, dysphagia and rectal bleeding.

### Number of Procedures

<table>
<thead>
<tr>
<th>Year</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>240</td>
</tr>
<tr>
<td>2008</td>
<td>561</td>
</tr>
<tr>
<td>2009</td>
<td>706</td>
</tr>
<tr>
<td>2010</td>
<td>625</td>
</tr>
<tr>
<td>2011</td>
<td>631</td>
</tr>
</tbody>
</table>

†2007 – 2008 data includes patients aged 6 years or older.
‡2009 data expanded to patients aged 4 years or older undergoing procedures.
§2010 data expanded to patients aged 2 years or older undergoing procedures.
¶2011 data includes patients aged 2 years or older undergoing outpatient endoscopic procedures in an ambulatory setting.

<table>
<thead>
<tr>
<th>Year</th>
<th>Postprocedural Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2.9%</td>
</tr>
<tr>
<td>2008</td>
<td>5.5%</td>
</tr>
<tr>
<td>2009</td>
<td>5.8%</td>
</tr>
<tr>
<td>2010</td>
<td>4.8%</td>
</tr>
<tr>
<td>2011</td>
<td>4.0%</td>
</tr>
</tbody>
</table>
**Pediatric Wireless Capsule Endoscopy**

Wireless capsule endoscopy is a procedure that is used to identify small-intestine abnormalities. This procedure may be indicated in selected children with symptoms such as abdominal pain and gastrointestinal bleeding. It aids in identifying small-bowel vascular and mucosal abnormalities and in assessing the extent of small-bowel disease in patients with suspected or confirmed Crohn’s disease.

From 2002 to 2011, Cleveland Clinic’s Department of Pediatric Gastroenterology performed 365 wireless capsule endoscopies in pediatric and young adult patients aged 3 to 23 years. Indications for wireless endoscopy in these patients included abdominal pain, diarrhea, gastrointestinal bleeding, inflammatory bowel disease, protein-losing enteropathy and polyposis syndromes. The endoscopy capsule was either swallowed by the patient (90.7 percent) or deployed at the time of endoscopy (9.3 percent). Optimally, the study is completed to the level of the cecum. Capsule endoscopy results were retrospectively reviewed.

**Wireless Capsule Endoscopy Outcomes**

**2002 – 2011**

<table>
<thead>
<tr>
<th></th>
<th>365</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of studies performed</td>
<td>365</td>
</tr>
<tr>
<td>Studies completed to cecum, N (%)</td>
<td>293 (80.3)</td>
</tr>
<tr>
<td>Positive findings, N (%)</td>
<td>127 (34.8)</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>88</td>
</tr>
<tr>
<td>Polyps</td>
<td>7</td>
</tr>
<tr>
<td>Vascular lesions</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>22</td>
</tr>
<tr>
<td>Capsule retention, N (%)</td>
<td>4 (1.1)</td>
</tr>
</tbody>
</table>
Pediatric Liver Transplantation

From 2005 to 2011, the Department of Pediatric Gastroenterology performed 31 pediatric liver-only transplants and one liver-pancreas transplant in patients aged 6 months to 19 years (mean 8.8 ± 7.3 years, median 10 years). Sixteen males and 14 females received transplants, with one male and one female each receiving a re-transplant for a failed liver allograft.

After an initial evaluation, all patients were listed for a deceased-donor graft, but other possibilities explored included obtaining a graft from a living donor, a split liver, or whole organ transplantation from a deceased donor. Seventeen patients received a whole organ from a deceased donor, eight patients received a split liver (four left lobes, three left lateral segments and one right lobe), and seven received a partial liver (seven left lateral segments) from living donors.

For primary liver-only pediatric transplants, patient survival was 93.1 percent at one and three years; liver-only graft survival was 87.1 percent at one and three years.
Pediatric Liver-Only Transplant*: Three-Year Patient Survival (N = 29)
2005 – 2011

Percent Survival

Pediatric Liver-Only Transplant*: Three-Year Graft Survival (N = 31)
2005 – 2011

Percent Survival

*All liver transplant outcomes are reported to the Scientific Registry of Transplant Recipients (SRTR). For detailed liver transplant national benchmarks and outcome comparisons, go to srtr.org.
Pediatric General Surgery

The introduction of laparoscopic operations in pediatric surgery nearly a generation ago had an enormous impact on children of all ages. Laparoscopic surgery represented a significant improvement over conventional open surgery performed through large incisions because it was associated with less postoperative pain, earlier return of intestinal function and improved cosmesis. Most of these procedures used multiple “ports” placed through mini-incisions in the abdominal wall. Fifteen years later, the technology now exists to perform some of these laparoscopic procedures by using specialized equipment placed through a single port. First used in adults, these single-port techniques were quickly adopted by pediatric surgeons for use in children. However, the larger specialized ports employed in adult surgery are often too large for children and adolescents, and their use can result in more pain and cosmetically unappealing scars.

Cleveland Clinic’s Department of Pediatric Surgery has been pioneering an alternative method of performing single-port surgery in children. The method uses a novel operating laparoscope and other unique tools that do not require the placement of the larger, specialized single-access ports used in adults. So far, this new technique has been applied to appendectomies and cholecystectomies in children of all ages, with excellent early results. Below are preliminary data on this new approach to these two common surgical procedures.

**Pediatric Surgery: Laparoscopic Cholecystectomy**

<table>
<thead>
<tr>
<th>Number of Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Since first using this new technique for single-port cholecystectomy in 2010, our surgical team has become more confident of its advantages over the traditional four-port technique and convinced of its efficacy and safety in properly selected pediatric patients. While the department employed the single-port approach in about 15 percent of cases in 2010, by 2011 the proportion of single-port cases rose to more than 60 percent. There have been no instances of bile duct injury, cystic duct leak, infection or other complications in the initial single-port group. The length of stay remains about one day. As more experience is acquired, our team anticipates that a larger number of single-port cholecystectomies will be performed on an outpatient basis. A report on our technique for single-port cholecystectomy in children has been submitted for publication.
The use of single-port techniques for laparoscopic appendectomy also has increased over the past two years, from approximately 30 percent to more than 40 percent. The majority of nonperforated appendices can be removed using a single port — even retrocolic and pelvic appendices. A large number of perforated appendices also can be removed by single-port surgery, although complicated cases requiring stapled resections are still often better done using a conventional multiport approach. The length of stay for appendicitis is determined by the need for postoperative antibiotics and supportive care; therefore, it is not affected by the choice of single- or multiple-port approaches. No difference has been detected in postoperative infections (either intra-abdominal abscesses or superficial wound infections) between the single-port and multiple-port groups.

Further patient accrual will be necessary to determine if there is a subgroup of appendicitis patients that clearly benefits from a single-port approach with respect to empiric, measurable outcomes. Subjectively, our surgical team believes that patients with nonperforated appendicitis, or those with complicated perforated appendicitis who require delayed appendectomy after a prolonged course of antibiotics, experience less postoperative pain through the omission of two lower abdominal port sites. Patient acceptance of the new procedures has been uniformly positive in both the appendectomy and cholecystectomy groups.
Influenza Vaccine Initiative

It is recommended that all children undergoing chemotherapy or who are less than six months from completion of chemotherapy receive the yearly influenza vaccine. It is also recommended that children with sickle cell disease receive the influenza vaccine. Cleveland Clinic’s Department of Pediatric Hematology/Oncology generates a list of all active patients in the practice who need the vaccine. When the vaccine becomes available, a letter is mailed to the home advising the patient to see his or her primary care physician or to make an appointment with Pediatric Hematology/Oncology to receive the vaccine. If the primary care physician administers the influenza vaccine to the patient, the family is instructed to notify us. The department then documents in the electronic medical record when the patient received the vaccination.

The Flu Shot Initiative in Pediatric Hematology/Oncology was implemented during the 2002 to 2003 season. The department’s patient list is reviewed each morning to alert the nurses and providers to any remaining patients due for influenza vaccine. If a child is well, the vaccine is administered; if a child is ill, the appointment is rescheduled so that he or she can be given the vaccine when health has improved. In 2011, only two patients refused the influenza vaccine.

Due to the lower vaccination rate in sickle cell patients, the department plans to implement a reminder call to the families of these patients the day before the appointment. For those sickle cell patients who do not have a scheduled visit during the influenza season, the department will offer nurse visits for vaccination only.

Influenza Vaccination Rates of Pediatric Hematology Oncology

<table>
<thead>
<tr>
<th>Year</th>
<th>Oncology Patients</th>
<th>Sickle cell Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>132</td>
<td>76</td>
</tr>
<tr>
<td>2007</td>
<td>137</td>
<td>80</td>
</tr>
<tr>
<td>2008</td>
<td>162</td>
<td>90</td>
</tr>
<tr>
<td>2009</td>
<td>158</td>
<td>100</td>
</tr>
<tr>
<td>2010</td>
<td>172</td>
<td>110</td>
</tr>
<tr>
<td>2011</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

N/A 2007
Improving Postprocedural Complication Rates

Bone marrow aspiration, bone marrow biopsy and lumbar puncture are tools that are used in the diagnosis of several types of childhood cancer. The treatment of leukemia and lymphoma also involves injection of chemotherapy into the spinal fluid. For patient comfort and safety, these procedures are usually performed under general anesthesia, which is administered by a pediatric anesthesiologist. Bone marrow aspiration and biopsy complications may include bleeding or infection. Possible complications of lumbar puncture include multiple attempts to access the intrathecal space, postprocedural spinal headaches or infection.

To enhance patient satisfaction, in 2011, Pediatric Hematology/Oncology started performing many of these procedures in the outpatient clinic in addition to the pediatric operating room. The department continuously monitors for complications following bone marrow biopsy, bone marrow aspiration and lumbar puncture.

A comparison was made to determine whether there were differences in the complication rate in the outpatient clinic vs. the operating room. A procedural complication form completed by the provider was used. The nurse manager audited the process every three months.

No significant difference in complication rates was observed for the outpatient clinic vs. the operating room. The most common complications seen in the outpatient clinic were spinal headaches and multiple attempts to obtain the spinal fluid or bone marrow in very large or small patients. One patient had a localized skin infection at the lumbar puncture site.

In an effort to improve complication rates, complication trends will be followed every three months. Patients who develop spinal headaches will be offered pretreatment with caffeine prior to subsequent lumbar punctures to minimize the recurrence rate.

Postprocedural Complication Rates of Pediatric Hematology and Oncology Patients

<table>
<thead>
<tr>
<th>Percent</th>
<th>2004 (267)</th>
<th>2005 (228)</th>
<th>2006 (216)</th>
<th>2007 (360)</th>
<th>2008 (313)</th>
<th>2009 (374)</th>
<th>2010 (N/A)</th>
<th>2011 (424)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>2004</td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>267</td>
<td>228</td>
<td>216</td>
<td>360</td>
<td>313</td>
<td>374</td>
<td>N/A</td>
<td>424</td>
</tr>
</tbody>
</table>
Pediatric hospitalists use care paths (developed through the use of evidence-based medicine) to improve quality of care and to standardize clinical practice. An asthma care path used at Cleveland Clinic Children’s Hospital has demonstrated good compliance with The Joint Commission asthma measures. This care path has consistently supported a relatively short hospital length of stay without adversely affecting quality measures and readmission rates.

**Asthma Care Path Mean Length of Stay**

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>108</td>
<td>116</td>
<td>97</td>
<td>81</td>
<td>65</td>
<td>46</td>
</tr>
</tbody>
</table>

**Graph**

- PICU mean LOS
- Mean LOS
Asthma care measures are used to measure compliance with evidence-based practice in caring for patients with asthma. Utilization of these practices has been shown to reduce severe illness and/or death, as well as unnecessary visits to the hospital.

**Percentage of Children Given Medication While Hospitalized**

<table>
<thead>
<tr>
<th>Year</th>
<th>Medication Type</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Systemic corticosteroids</td>
<td>101</td>
<td>96</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td>Asthma relievers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CMS benchmark*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*N = 2010 101, 2010 96, 2011 186

*Benchmark source: The Centers for Medicare & Medicaid Services’ Hospital Compare report, which compares quality measures among similar local hospitals and with national percentages. The report can be found at hospitalcompare.hhs.gov.

**Percentage of Pediatric Asthma Patients Who Received Home Management Plan While Hospitalized**

<table>
<thead>
<tr>
<th>Year</th>
<th>Home Management</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>99</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>CMS benchmark*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*N = 2010 99, 2011 93

*Benchmark source: The Centers for Medicare & Medicaid Services’ Hospital Compare report, which compares quality measures among similar local hospitals and with national percentages. The report can be found at hospitalcompare.hhs.gov.
Cleveland Clinic Children’s Hospital has initiated several quality improvement projects directed at reducing pediatric surgical site infections. The hospital joined The Ohio Children’s Hospital Solutions for Patient Safety Collaborative, a group of eight children’s hospitals devoted to developing and sharing quality initiatives. As part of the collaborative, Children’s Hospital initiated an enhanced surveillance program aimed at tracking surgical site infection rates and complying with measures to prevent these infections. Measures introduced include:

- adding the need for antibiotics to the preoperative surgical safety checklist,
- adopting recommendations for optimal pediatric (mg/kg) dosing,
- changing recommended antibiotic redosing intervals for long procedures to every three hours (every six hours for vancomycin), and
- adding standard pediatric antibiotic doses to the OR PIXIS®.

In Ohio, hospitals publicly report pediatric surgical site infection rates for specific cardiac, neurologic and orthopaedic surgery procedures. The data presented below correspond to the procedure codes used for Ohio public reporting. Across Children’s Hospital, compliance with preoperative antibiotic guidelines increased from 91.4 percent in 2009 to 98.2 percent in 2010, then to 100 percent in 2011 across major cardiac, neurologic and orthopaedic surgery procedures ($P < 0.0001$, for 2009 vs. 2011). Correspondingly, the aggregate infection rate has decreased from 6.1 percent in 2009 to 4 percent in 2010 to 1 percent in 2011 ($P < 0.006$, for 2009 vs.

### Compliance with Antibiotic Timing Guidelines and Corresponding Infection Rate for Orthopaedic Spine Procedures (N = 256)

The infection rate after orthopaedic spine procedures decreased from 9.9 percent in 2009 to 4.9 percent in 2010, and to 2.1 percent in 2011 ($P < 0.05$, for 2009 vs. 2011). Compliance with preoperative antibiotic timing guidelines improved from 90.1 percent in 2009 to 96.3 percent in 2010, then to 100 percent in 2011 ($P < 0.002$, for 2009 vs. 2011).
Compliance with preoperative antibiotic timing recommendations increased from 78.6 percent in 2009 to 100 percent for the years 2010 and 2011 ($P < 0.03$). For the past two years, no child has developed an infection following the placement of a primary neurosurgical shunt ($P < 0.03$, for 2009 vs. 2010 and 2011).

Significant improvement in compliance with preoperative antibiotic guidelines was also observed among patients undergoing cardiac surgery, with an increase from 94.2 percent in 2009 to 99.2 percent in 2010, then to 100 percent in 2011 ($P < 0.03$, for 2009 vs. 2011). Infection rates were 1 percent for 2009, 3.9 percent for 2010 and 0 percent for 2011.
**Pediatric Critical Care**

**Mortality Rate**

Mortality is the best marker of quality outcomes in a pediatric intensive care unit (PICU), and is one of six measures endorsed by the National Quality Forum in PICU settings. Cleveland Clinic Children’s Hospital’s PICU had 14 mortalities in 2011. The PICU’s severity-adjusted ratio of observed-to-predicted mortality was well below the national average.

**PICU Probability of Death**

2011

*PIM2 = Pediatric Index of Mortality, PRISM III = Pediatric Risk of Mortality score
Source: Virtual PICU Systems LLC*
PICU Standardized Mortality Ratio

2011

*PIM2 = Pediatric Index of Mortality, PRISM III = Pediatric Risk of Mortality score
Source: Virtual PICU Systems LLC

PICU Observed-to-Predicted Mortality

*PIM2 = Pediatric Index of Mortality, PRISM III = Pediatric Risk of Mortality score
Source: Virtual PICU Systems LLC
Pediatric Central Line-Associated Bloodstream Infections

The PICU continued efforts to reduce hospital-acquired infections in 2011. Our unit maintained a central line-associated bloodstream infection rate of 2.9 per 1,000 central line days. PICU staff and personnel also have focused on preventing other hospital-acquired infections and have been extremely effective in this endeavor. A tracking method used within the PICU for prevention is monitoring the “days since last infection.”

Pediatric Central Line-Associated Bloodstream Infections per 1,000 Central Line

<table>
<thead>
<tr>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

N = 2009 4, 2010 6, 2011 7

PICU Days Since Last Infection

2011

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>N</th>
<th>Days Since Last Infection</th>
<th>Rate, %</th>
<th>National Benchmark*, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridium difficile (patient days)</td>
<td>4,772</td>
<td>718</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Hospital-acquired viral illness (patient days)</td>
<td>4,772</td>
<td>800</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia (ventilator days)</td>
<td>2,400</td>
<td>1,941</td>
<td>0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Pediatric Catheter-Associated Urinary Tract Infection Rate per 1,000 Catheter Days

**Rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2010</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

The PICU had three catheter-associated urinary tract infections during 2011, for an infection rate of 2.9 per 1,000 Foley catheter days.

PICU Unplanned Extubations per 1,000 Ventilator Days

**Rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>Rate</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2009</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>2010</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>2011</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

*National benchmark: 10 extubations per 1,000 ventilator days*

Numerator: Any unplanned removal of an endotracheal tube
Denominator: 100 ventilator days (ventilator days/100). “1 day” = use of ventilator for any period of time during a 24-hour period (from 12 a.m. to 11:59 p.m.)

The unit’s unplanned extubation rate remained low and below the national benchmark in 2011, with 19 unplanned extubations in 2,400 total ventilator days (rate: 7.9 per 1,000 ventilator days).
Neonatal Intensive Care Unit

Neurodevelopmental Outcomes

Preterm and high-risk infants discharged from the neonatal intensive care units (NICUs) within the Cleveland Clinic health system are referred to the NICU Follow-up Clinic at Cleveland Clinic Children’s Hospital for Rehabilitation Shaker Campus. Neurodevelopmental follow-up is offered until 2 to 3 years corrected age.

In 2011, 143 new patients were evaluated, and the follow-up of 183 established NICU patients continued. Neurodevelopmental testing using the Bayley Scales of Infant Development, 3rd Edition (BSID-III) was completed. Cognitive, language and motor composite BSID-III scores between 85 and 115 are considered normal. These scores are used to determine children's performance compared with normal values for children of their age (in months).

Neurodevelopmental Outcomes for Preterm and High-Risk Infants (N = 132)

2011

<table>
<thead>
<tr>
<th></th>
<th>Infants &lt; 12-Mo Corrected Age Median (Range)</th>
<th>Infants ≥ 12-Mo Corrected Age Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Infants (N = 71)</td>
<td>Very Low Birthweight Infants (N = 34)</td>
</tr>
<tr>
<td>Birthweight (g)</td>
<td>1,511 (570-4,630)</td>
<td>1,022 (570-1,450)</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>31 (24-41)</td>
<td>27.5 (24-36)</td>
</tr>
<tr>
<td>Corrected age at testing (mo)</td>
<td>8.5 (6-11.5)</td>
<td>8.5 (7-10)</td>
</tr>
<tr>
<td>BSID-III composite score (mean ± SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>105 ± 11.6</td>
<td>104 ± 10.7</td>
</tr>
<tr>
<td>Language</td>
<td>103 ± 12.6</td>
<td>103 ± 12.5</td>
</tr>
<tr>
<td>Motor</td>
<td>104 ± 17.7</td>
<td>103 ± 15.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Infants ≥ 12-Mo Corrected Age Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Infants (N = 61)</td>
<td></td>
</tr>
<tr>
<td>Very Low Birthweight Infants* (N = 33)</td>
<td></td>
</tr>
<tr>
<td>Birthweight (g)</td>
<td>1,456 (530-3,970)</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>30 (24-40)</td>
</tr>
<tr>
<td>Corrected age at testing (mo)</td>
<td>21.5 (12-36)</td>
</tr>
<tr>
<td>BSID-III composite score (mean ± SD)</td>
<td></td>
</tr>
<tr>
<td>Cognitive</td>
<td>98 ± 19.1</td>
</tr>
<tr>
<td>Language</td>
<td>94 ± 17.8</td>
</tr>
<tr>
<td>Motor</td>
<td>95 ± 19.7</td>
</tr>
</tbody>
</table>

* Very low birthweight infants are defined as infants having a birthweight of less than 1,500 grams.
### Outcomes for NICU Graduates at 18- to 24-Months Corrected Age (N = 48) 2011

<table>
<thead>
<tr>
<th>Outcome</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehospitalized after NICU discharge</td>
<td>23 (48)</td>
</tr>
<tr>
<td>Surgical intervention after NICU discharge</td>
<td>19 (40)</td>
</tr>
<tr>
<td>Abnormal eye exam</td>
<td>6 (13)</td>
</tr>
<tr>
<td>Abnormal hearing exam</td>
<td>1 (2)</td>
</tr>
<tr>
<td><strong>Tone issues</strong></td>
<td></td>
</tr>
<tr>
<td>Hypotonia</td>
<td>7 (15)</td>
</tr>
<tr>
<td>Hypertonia</td>
<td>10 (21)</td>
</tr>
<tr>
<td>Hypotonia and hypertonia</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Formally diagnosed with cerebral palsy</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Referred for or continued therapy services (physical, occupational and/or speech)</td>
<td>28 (58)</td>
</tr>
</tbody>
</table>

Although a few infants had neurologic impairments, the majority of NICU graduates evaluated at almost 2 years corrected age appeared to have no neurodevelopmental delays.
Impact of Passive Cooling During Transport and Hypothermia Therapy on Neurodevelopmental Outcomes in Infants Born with Hypoxic-Ischemic Encephalopathy

Since early 2009, Cleveland Clinic Children’s Hospital has been a major referral center for whole-body hypothermia therapy in infants born with hypoxic-ischemic encephalopathy (HIE). It is well documented that whole-body hypothermia reduces the risk of death or disability in infants with moderate or severe HIE. Recent studies suggest that passive cooling during transport may also be beneficial.

Our group identified 14 infants born at community hospitals between May 2009 and April 2011 who were diagnosed with HIE and transported to the Children’s Hospital Level III NICU. Five of these infants were passively cooled during transport (i.e., no radiant heat utilized), and the other nine were kept euthermic during transport. All infants were treated utilizing a standardized hypothermia protocol. Infants who were passively cooled reached the target temperature for hypothermia 45 minutes sooner than the infants who were not passively cooled. Neurodevelopmental follow-up was completed after discharge using the BSID-III.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Esophageal temperature</strong></td>
<td><em><em>PCT</em> Group (N = 5)</em>*</td>
<td><em><em>NPCT</em> Group (N = 9)</em>*</td>
<td></td>
</tr>
<tr>
<td>33.0-33.9 °C &gt; 95% of time</td>
<td>100%</td>
<td>78%</td>
<td></td>
</tr>
</tbody>
</table>

| **BSID-III composite score (mean ± SD) at 9 months of age** |
|---|---|---|
| Cognitive | 90 ± 21.1 | 92 ± 20.4 |
| Language | 98 ± 20.5 | 89 ± 16.4 |
| Motor | 111 ± 27.6 | 84 ± 26.8 |

*PCT = passively cooled during transport, NPCT = not passively cooled during transport

Whole-body hypothermia therapy is well utilized in the Children’s Hospital NICU for treatment of neonatal HIE. Our team has incorporated passive cooling during transport into its hypothermia therapy protocol because it reduces temperature variation and may have significant impact on long-term developmental outcomes in infants with HIE.
The Ohio Perinatal Quality Collaborative (OPQC) is a consortium of neonatal units dedicated to reducing infections in infants 22 to 29 weeks gestational age. In 2008, Cleveland Clinic’s NICU implemented several initiatives for the prevention of late-onset infections.

In 2011, the NICU had one late-onset central line-associated bloodstream infection (CLABSI) in the 22-to-29-weeks gestation population. “Late-onset” refers to CLABSIs occurring after 72 hours of age.

The OPQC added a human milk component to its prevention program in 2011, with the goals of advancing nutrition and helping to prevent late-onset infections in neonates.

**Neonatal ICU Central Line-Associated Bloodstream Infection Rate per 1,000 Central Line Days for All Gestational Ages (N = 5)**

2011

<table>
<thead>
<tr>
<th>Rate</th>
<th>12</th>
<th>10</th>
<th>8</th>
<th>6</th>
<th>4</th>
<th>2</th>
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<td>Feb</td>
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<td>Mar</td>
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<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>May</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Jun</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Jul</td>
<td>2</td>
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<td>4</td>
<td>4</td>
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<td>Aug</td>
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<td>4</td>
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<td>4</td>
</tr>
<tr>
<td>Oct</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<td>4</td>
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<td>Nov</td>
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<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*Rate per 1,000 CL days
Mean NICU rate
Benchmark*

*Benchmark: The National Healthcare Safety Network’s mean expected CLABSI rate was 1.6 in 2011.
Source: *American Journal of Infection Control*, December 2011

Cleveland Clinic’s main campus NICU had a mean observed CLABSI rate of 2.8 in 2011.
Neonatology

**Neonatal ICU Ventilator Days**

There was an increase in the total number of ventilator days in 2011. The number of neonates weighing less than 1,500 grams who required mechanical ventilation also increased in 2011.

The overall rate of ventilator days for 2011 in comparison with 2009 was lower due to a continued increase in the use of noninvasive ventilation and to targeting early extubation.

**Neonatal ICU Unplanned Extubation Rate per 100 Ventilator Days**

There was a decrease in the number of unplanned extubations in 2010, and again in 2011, after implementation of a quality improvement project in 2010 at Cleveland Clinic's NICU. While total ventilator days slightly increased in 2011, the unplanned extubation rate was lower.

Numerator: Any unplanned removal of an endotracheal tube. (Unplanned = any extubation that is not ordered by medical personnel.) Denominator: 100 ventilator days (ventilator days/100). 1 day = use of a ventilator for any period of time during a 24-hour period (from 12 a.m. to 11:59 p.m.)
Cleveland Clinic’s Pediatric Neurology and Neurosurgery program is ranked #1 in Ohio for the fifth consecutive year and among the top 3 programs in America by US News & World Report for 2012-2013. Our renowned physician team includes subspecialists in every area. The following outcomes highlight our results for diagnosis and treatment of pediatric epilepsy, neurometabolic disorders, neuromuscular disorders, headache, spasticity, dystonia, and sleep disorders.

**Seizure Severity in Medically Treated Pediatric Epilepsy Patients (N = 275)**

2008 – 2011

In the pediatric age group, the LSSS\(^1\) showed a significant improvement from the initial visit to the last follow-up in patients treated with medications alone (reduction in mean LSSS from 32.0 (± 1.5) to 15.6 (± 1.5) (P < 0.0001).

N = number of patients with greater than six months of follow-up. Mean duration of follow-up was 18 months. The standard box plots reflect the median and the 25th and 75th quartiles. Higher scores reflect more severe seizures.

Reference


**Seizure Frequency in Medically Treated Pediatric Epilepsy Patients (N = 275)**

2008 – 2011

<table>
<thead>
<tr>
<th></th>
<th>Cleveland Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responder rate (≥ 50% reduction in seizure frequency)</td>
<td>56%</td>
</tr>
<tr>
<td>Percent seizure-free at 6 months</td>
<td>45%</td>
</tr>
</tbody>
</table>

Pediatric patients saw a reduction in seizure frequency: 56 percent of patients seen between 2008 and 2011 had a 50 percent or greater reduction in seizure frequency. Mean duration of follow-up was 18.0 months. Forty-five percent became completely seizure-free at six months of follow-up after their initial visit.
Long-term chances of achieving and maintaining seizure-freedom following various types of epilepsy surgery are shown in the following graphs. Whenever possible, our data were compared to national published data. We used the widely accepted Engel classification\(^1\) of seizure-freedom to classify our seizure outcomes (seizure-free = Engel class 1).

**Seizure Outcomes in Surgically Treated Epilepsy Patients (Adult and Pediatric Patients)**

Forty-four percent of patients with previously medically intractable epilepsy remained seizure-free 12 years after surgical treatment at Cleveland Clinic’s Epilepsy Center. Individual curves of seizure outcomes show similar long-term chances of seizure-freedom in adult and pediatric patients who underwent epilepsy surgery at the center between 1996 and 2011.

**Reference**

Patients with life-threatening, catastrophic epilepsy may be candidates for hemispherectomy, one of the most complex types of epilepsy surgery. The graph reflects the percent of patients who continue to be completely seizure-free up to eight years following a hemispherectomy.

Beyond improvements in seizure frequency, several other benefits were observed after hemispherectomy:

- Seizure medication reduction: 57 percent of patients discontinued all seizure medications by last follow-up, and 17 percent were only taking one seizure medication.

- Functional improvement: 83 percent of patients were walking independently at last follow-up, with an additional 9 percent requiring minimal assistance for ambulation.

- Cognitive and language development: With early surgery, seizure-freedom and aggressive postoperative therapy, 36 percent had age-appropriate language and 34 percent had modestly delayed language at last follow-up. Forty-two percent of patients were reading at age-appropriate levels at last follow-up. These rates were actually a few percentage points better than the language performance of our patients before surgery (cognition and language typically worsen with chronic epilepsy and persistent seizures; by stopping seizures, epilepsy surgery can prevent further decline but is not typically expected to improve cognition and language).
**Pediatric Epilepsy: Effect of Treatment on Healthcare Utilization**

Treatment benefits for patients in the pediatric age group extended beyond the improvements seen in seizure frequency and severity.

**Hospitalization Rates in Surgically Treated Pediatric Epilepsy Patients (N = 234)**

2009 – 2011

**Mean Hospitalization Rate (per 3 Months)**

Healthcare utilization improved significantly from before surgery to the last follow-up visit. The number of hospitalizations in the three months preceding each visit decreased from a mean of 0.17 hospitalizations over three months (± 0.02) at initial visit to a mean of 0.07 (± 0.02) at last visit (P = 0.009), a 59 percent reduction in frequency of hospitalization. N = pediatric patients with greater than six months of follow-up. Mean duration of follow-up was 16.5 months.
Emergency Room Visits in Surgically Treated Pediatric Epilepsy Patients (N = 231)

2009 – 2011

There was a significant reduction in the frequency of emergency room (ER) visits, from a mean of 0.45 emergency room visits (± 0.06) in the three months preceding the initial visit to 0.16 (± 0.06) at the last follow-up visit (P = 0.0005), a 64 percent reduction in frequency of ER visits. N = pediatric patients with greater than six months of follow-up. Mean duration of follow-up was 16.5 months.
**Pediatric Neurometabolic Clinic**

The term “idiopathic developmental delay” is used to define some 3 percent of the population that has unexplained neurologic and developmental symptoms, including epilepsy. Until recently, this population of children and adults, some with progression of their symptoms for unexplained reasons, remained largely without a diagnosis. With advances in technology and improving diagnostic skills, the ability to reach a conclusive diagnosis in this population has steadily improved. While there is no national standard, tertiary care centers such as ours have the potential to reach a diagnosis 30 to 50 percent of the time.\(^1\)

**Neurometabolic Clinic Diagnostic Yield**

2011

![Bar chart showing the number of patients evaluable and the number with a diagnosis established.]

In 2011 the Neurometabolic Clinic evaluated 323 patients presenting with unexplained neurologic and/or developmental symptoms, and we were able to establish a diagnosis in 73 patients or 23 percent. In those 73 patients, diagnosis was established using cerebrospinal fluid testing (7 percent), muscle biopsy (5 percent), genetic testing (78 percent), biochemical studies (5 percent), or clinical criteria alone (4 percent). Patients with idiopathic autism are excluded.

Reference

Rating of Outpatient Care and Services: Neurometabolic Clinic (N = 11)

2011

Mean Patient Satisfaction Score

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean</th>
<th>Benchmark*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Assessment of Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating of Care Provider's Explanations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood of Recommending Care Provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Rating of Care Provider</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Benchmark: Mean scores for all Press-Ganey hospital clients.
Source: Press-Ganey, a national hospital survey vendor

Providing a diagnosis in a compassionate, comprehensive way greatly impacts patient and family satisfaction. Mean patient satisfaction scores (outpatient medical practice survey results) for a sample of new patients seen in the Neurometabolic Clinic at Cleveland Clinic main campus are higher than benchmark. Higher scores indicate greater patient satisfaction.
Over 50 percent of pediatric patients treated for headache in 2011 showed an improvement in PedsMIDAS® (Migraine Disability Assessment Score). Nearly 50 percent of patients also noted a reduction in the number of school days missed in the preceding three months. Mean duration of follow-up was 285 days.
Pediatric Spasticity and Dystonia

Pain Level and Spasm Frequency Following Botulinum Toxin Injection

2011

Overall, botulinum toxin injection appears to have a modest effect on spasticity and dystonia in children, but can produce dramatic improvements in specific cases. Mean duration of follow-up was 222 days for pain level and 198 days for spasm frequency data.

Goal Attainment Following Botulinum Toxin Injection (N = 40)

2011

Goal attainment measures how well goals were satisfied after the last botulinum toxin injection. Mean duration of follow-up was 191 days. Goal attainment was as expected or above in all but four patients in 2011.
Tone and Mobility Status Following Botulinum Toxin Injection

2011

Patients (%)

<table>
<thead>
<tr>
<th></th>
<th>Improved</th>
<th>Stable</th>
<th>Worsened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spasticity</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adductor Tone</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility Status</td>
<td>47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this patient sample (of a total of 107 patients treated with botulinum toxin injections in 2011, supplemented by physical therapy), spasticity was well controlled, with few worsening and most remaining stable or improving over a period of up to one year. The Ashworth Tone scale assesses the degree of spasticity. Adductor Tone estimates the tone of the hip adductor muscles, commonly involved in cerebral palsy and with important implications for daily care. Hip adductor spasticity, if not corrected, promotes hip dislocation. Mobility Status is derived from the Gross Motor Functional Classification System (GMFCS), which is a five-level classification system that describes the motor function of patients with spastic/ dystonic cerebral palsy. The natural history of children with cerebral palsy, without anti-spasticity management, is slow but progressive worsening of mobility status. The level of mobility as determined by GMFCS remained either the same or improved in most children with cerebral palsy who received botulinum toxin therapy at Cleveland Clinic.
**Pediatric Sleep Disorders**

Cleveland Clinic’s Sleep Disorders Center provides multidisciplinary care for adults and children with sleep and wake disorders. Comprehensive care is provided through integration of specialists in Neurology, Internal Medicine, Pulmonary and Critical Care Medicine, Psychiatry and Psychology, Pediatrics and Otolaryngology.

**Pediatric Sleep Studies**

The number of pediatric sleep studies continues to increase yearly. Children ages 12 and older without special needs can be tested at any one of nine sleep laboratory locations.

**Daytime Sleepiness in Adolescents (N = 29)**

Daytime sleepiness in adolescents, as measured with the Cleveland Adolescent Sleepiness Questionnaire (CASQ), decreased in patients who were seen by a pediatric sleep specialist. The CASQ is used in patients ages 11 to 17 years. Average duration of follow-up from first to last follow-up visit was 267 days.
### Pediatric Surgery (< 18 years of age), 2006 - 2011

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Yearly Volume</th>
<th>Average Age, Years</th>
<th>Males/Females, %</th>
<th>Inpatients, %</th>
<th>Inpatient LOS, Days</th>
<th>Discharged Home, %</th>
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<tbody>
<tr>
<td><strong>Shoulder Surgery</strong></td>
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<td>60/40</td>
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Key: LOS = length of stay, ACL = anterior cruciate ligament, - = insufficient data
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<th>Procedure</th>
<th>30-Day Readmission Rate, %</th>
<th>30-Day Reoperation Rate, %</th>
<th>Limb-Related Physical Limitations*</th>
<th>1-Year Infection Rate, %</th>
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<td>Open Surgery</td>
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<td>Arthroscopic Surgery</td>
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</tr>
<tr>
<td>Treatment of labral tear</td>
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<tr>
<td>Knee Surgery</td>
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<tr>
<td>Open Surgery</td>
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<td>ACL reconstruction</td>
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<td>7.6</td>
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<td>6.2</td>
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*Values for limb-related physical limitations are scores (range, 0 - 10).
Key: Baseline = preoperative score, 90-Day Follow-Up = 90-day postoperative score, ACL = anterior cruciate ligament, - = insufficient data
Post-Tonsillectomy Bleeding with or Without Adenoidectomy (Pediatric and Adult) (N = 522)

The above graph includes patients under 18 (pediatric) and those 18 and over (adult) in both ambulatory and inpatient settings.

*In reviewing two large studies, the incidence of bleeding can vary from 1.6 percent to 3.9 percent (pediatrics compared with adults).

References


Cleveland Clinic’s departments of General and Community Pediatrics provide general pediatric care to children and adolescents in the community. Together, more than 70 providers serve as primary care physicians to some 100,000 patients in Northeast Ohio and surrounding communities. The departments collaborate to develop and maintain quality initiatives, aiming to provide timely, comprehensive, safe and appropriate care while promoting the health and well-being of patients.

Immunization

In 2011, primary care pediatrics transitioned the Childhood Immunization Status measure to the new combination 10 schedule, as defined by the National Committee for Quality Assurance (NCQA) in its The State of Health Care Quality 2011 report. This measure looks at the percentage of children 2 years of age who received all recommended immunizations, which now includes hepatitis A, rotavirus and influenza. With this all-inclusive requirement, the department mean fell from its historical rates, but still remains well above the national 90th percentile rate of 30.5 percent.

Compliance with Childhood Immunization Schedule (N = 3,406)

2011

<table>
<thead>
<tr>
<th>Mean Percent</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<td>Children’s Hospital</td>
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<tr>
<td>Benchmark*: 90th percentile</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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</table>

*Benchmark: Target = 30.5% based on the Healthcare Effectiveness Data and Information Set’s Effectiveness of Care Measure commercial PPO 90th percentile rate (published in the National Committee for Quality Assurance’s The State of Health Care Quality 2011 report found at ncqa.org).
The adolescent immunization schedule similarly transitioned in 2011 and now includes tetanus-diphtheria-acellular pertussis (Tdap) or tetanus-diphtheria (Td), and meningococcal vaccination by age 13 years. The department mean approximates the national 90th percentile rate of 75.2 percent.

*Benchmark: Target = 75.2% based on the Healthcare Effectiveness Data and Information Set’s Effectiveness of Care Measure commercial PPO 90th percentile rate (published in the National Committee for Quality Assurance’s The State of Health Care Quality 2011 report found at ncqa.org).
Appropriate Care

Two additional measures — appropriate treatment of upper respiratory infection (URI) and appropriate treatment of pharyngitis — reflect our ongoing effort to curtail the misuse of antibiotics. Appropriate treatment of URI is defined as no antibiotic therapy. Appropriate treatment of pharyngitis is defined as use of antibiotics only after positive findings from confirmatory testing for group A streptococcus. The department means are above national 90th percentile rates of 94.5 percent for URI and 90.5 percent for pharyngitis.

**Appropriate Treatment of Upper Respiratory Infection (No Antibiotic Therapy) (N = 1,905)**

2011

**Mean Percent**

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<td>100</td>
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</table>

*Benchmark*: 90th percentile

*Benchmark*: Target = 94.5% based on the Healthcare Effectiveness Data and Information Set’s Effectiveness of Care Measure commercial PPO 90th percentile rate (published in the National Committee for Quality Assurance’s *The State of Health Care Quality 2011* report found at ncqa.org).

**Appropriate Treatment of Pharyngitis (Antibiotics Only for Group A Strep) (N = 2,177)**

2011

**Mean Percent**

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
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<th>Q3</th>
<th>Q4</th>
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<tbody>
<tr>
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</table>

*Benchmark*: 90th percentile

*Benchmark*: Target = 90.5% based on the Healthcare Effectiveness Data and Information Set’s Effectiveness of Care Measure commercial PPO 90th percentile rate (published in the National Committee for Quality Assurance’s *The State of Health Care Quality 2011* report found at ncqa.org).
Asthma Care

In September 2009, four Cleveland Clinic pediatric primary care offices enrolled in the American Academy of Pediatrics Chapter Quality Network Asthma Project (Ohio Chapter) in collaboration with other practices throughout the state. Quality-of-care measures established by the collaborative include the use of a standardized tool to assess asthma control, adherence to the National Heart, Lung, and Blood Institute asthma guidelines to adjust therapy in a stepwise fashion, and the provision of an asthma action plan to the patient and family at every visit. In October 2011, the second wave of the collaborative started, and an additional six Cleveland Clinic practice sites enrolled.

Asthma Quality-of-Care Measures Achieved
Newborn Screening

Beginning in March 2010, the Department of General Pediatrics participated in a national collaborative with the American Academy of Pediatrics’ Quality Improvement Innovation Network to improve the quality of care pertaining to newborn metabolic and hearing screening. At the newborn’s first outpatient visit, providers are requested to document that the newborn screening test was collected prior to discharge from the nursery, to document the test results in the chart once they are received from the health department, and to document a discussion of the results with the family.

Newborn Screening Quality-of-Care Measures Achieved

Percent Achieved

<table>
<thead>
<tr>
<th>Quality Metric</th>
<th>2010 (N = 100)</th>
<th>2011 (N = 126)</th>
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<tbody>
<tr>
<td>Test Documented as Completed at First Visit</td>
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<tr>
<td>Results Documented in Chart</td>
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<tr>
<td>Results Shared with Family</td>
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Pediatric Pulmonary Function Testing

Pulmonary function testing provides an objective physiologic measure of disease control in asthma patients. The data below demonstrate a mean increase in the percentage of Cleveland Clinic's Pediatric Pulmonary Center patients aged 5 years or older who received a primary asthma diagnosis (ICD-9 code 493.X) based on pulmonary function testing during 2010 and 2011.

**Patients Aged ≥ 5 Years with Primary Asthma Diagnosis Based on Pulmonary Function Testing**

<table>
<thead>
<tr>
<th>Mean Percent</th>
<th>N = 2010</th>
<th>473</th>
<th>N = 2011</th>
<th>420</th>
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<td>80</td>
<td>100</td>
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</table>

Pediatric Pulmonary Asthma Control Testing

The Asthma Control Test™ (ACT) score represents the patient's/caregiver’s self-assessment of the patient's functional status. In accordance with National Heart, Lung, and Blood Institute recommendations, Pediatric Pulmonary Center patients were evaluated with several assessment tools. Quality improvement efforts were aimed at incorporating and tracking serial ACT scores in the patient’s electronic medical record (EMR). The following data demonstrate a mean increase in the percentage of pulmonary center patients aged 4 years or older who had a primary asthma diagnosis based on their ACT score, and for whom longitudinal data had been incorporated into the EMR.
The ACT score also categorizes patients into three control levels: not controlled, moderately controlled and well controlled. The data below demonstrate an aggregate improvement in functional status based on mean ACT scores assessed during an initial visit and at a follow-up visit in pulmonary center patients aged 4 years or older with a primary asthma diagnosis during 2011.

**Functional Status of Asthma Patients Aged ≥ 4 Years Based on Mean ACT* Score (N = 99)**

*ACT = Asthma Control Test
Disease Activity Assessment in Children with Juvenile Arthritis

Juvenile idiopathic arthritis (JIA) affects up to 300,000 children in the United States and can be associated with significant functional impairment if not properly recognized and treated. The Juvenile Arthritis Disease Activity Score (JADAS) is a validated, innovative arthritis activity assessment tool that allows providers to make a real-time assessment of arthritis disease activity.¹ This scoring system incorporates the parental global assessment of disease activity (Pa-GA), the physician global assessment of disease activity (MD-GA), the active joint count (27 standard joints) and the erythrocyte sedimentation rate into a single value representing disease activity. The JADAS is easily obtained during the clinic session and is simply interpreted (a low JADAS indicates less disease activity). Furthermore, the JADAS facilitates longitudinal monitoring of disease activity. Thus, in an effort to improve outcomes, Cleveland Clinic’s Center for Pediatric Rheumatology recently implemented the calculation and tracking of the JADAS in all JIA patients.

The JADAS was calculated for 113 unique patient visits in 2011. The unique patients examined represent 44 percent of all JIA patients seen at the center in 2011; these subjects were also enrolled in a national registry. Correlation with a variety of clinical factors was also examined.

The following table details the Cleveland Clinic JIA cohort demographics and disease characteristics.

Reference

Demographics and Disease Characteristics of Patients with Juvenile Idiopathic Arthritis (N = 113) 2011

<table>
<thead>
<tr>
<th>Demographics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female/male, N (%)</td>
<td>90 (80)/23 (20)</td>
</tr>
<tr>
<td>Caucasian/non-Caucasian, N (%)</td>
<td>102 (90)/21 (10)</td>
</tr>
<tr>
<td>Median age, years (range)</td>
<td>11 (2-20)</td>
</tr>
<tr>
<td>Private insurance, N (%)</td>
<td>90 (80)</td>
</tr>
<tr>
<td>Mean distance from clinic, miles (SD)</td>
<td>35 (38)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disease Characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean disease duration, years (SD)</td>
<td>4.6 (4.2)</td>
</tr>
<tr>
<td>ANA+/ANA-, N (%)</td>
<td>58 (51)/65 (49)</td>
</tr>
<tr>
<td>Current or previous uveitis, N (%)</td>
<td>13 (11)</td>
</tr>
<tr>
<td>JIA subtype</td>
<td></td>
</tr>
<tr>
<td>Oligoarticular, persistent, N (%)</td>
<td>33 (30)</td>
</tr>
<tr>
<td>Oligoarticular, extended, N (%)</td>
<td>14 (13)</td>
</tr>
<tr>
<td>Polyarticular, rheumatoid factor negative, N (%)</td>
<td>41 (37)</td>
</tr>
<tr>
<td>Polyarticular, rheumatoid factor positive, N (%)</td>
<td>8 (7)</td>
</tr>
<tr>
<td>Systemic onset, N (%)</td>
<td>8 (7)</td>
</tr>
<tr>
<td>Enthesitis-related, N (%)</td>
<td>7 (6)</td>
</tr>
<tr>
<td>Undifferentiated, N (%)</td>
<td>2 (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Immunosuppressive Regimen</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No medications, N (%)</td>
<td>16 (14)</td>
</tr>
<tr>
<td>Regular NSAID use, N (%)</td>
<td>10 (9)</td>
</tr>
<tr>
<td>Methotrexate, N (%)</td>
<td>74 (65)</td>
</tr>
<tr>
<td>Biologic response modifier, N (%)</td>
<td>48 (42)</td>
</tr>
<tr>
<td>Methotrexate + biologic response modifier, N (%)</td>
<td>36 (32)</td>
</tr>
</tbody>
</table>
Comparison of JADAS Scores by Subgroup (N = 113)

<table>
<thead>
<tr>
<th>Subtype</th>
<th>N</th>
<th>Mean JADAS (SD)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>113</td>
<td>7.5 (7.3)</td>
<td>-</td>
</tr>
<tr>
<td>Oligoarticular, persistent</td>
<td>35</td>
<td>6.0 (5.8)</td>
<td>0.09</td>
</tr>
<tr>
<td>Oligoarticular, extended</td>
<td>14</td>
<td>6.6 (5.5)</td>
<td>0.52</td>
</tr>
<tr>
<td>RF- polyarticular</td>
<td>41</td>
<td>8.4 (8.3)</td>
<td>0.39</td>
</tr>
<tr>
<td>RF+ polyarticular</td>
<td>8</td>
<td>8.2 (8.8)</td>
<td>0.84</td>
</tr>
<tr>
<td>Systemic-onset</td>
<td>8</td>
<td>8.4 (8.8)</td>
<td>0.80</td>
</tr>
<tr>
<td>Enthesitis-related</td>
<td>7</td>
<td>10.7 (8.3)</td>
<td>0.34</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>90</td>
<td>7.4 (7.8)</td>
<td>0.93</td>
</tr>
<tr>
<td>Male</td>
<td>23</td>
<td>7.5 (7.2)</td>
<td></td>
</tr>
<tr>
<td>ANA status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANA+</td>
<td>57</td>
<td>7.8 (6.9)</td>
<td>0.63</td>
</tr>
<tr>
<td>ANA-</td>
<td>56</td>
<td>7.2 (7.7)</td>
<td></td>
</tr>
<tr>
<td>Uveitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uveitis, current or past</td>
<td>13</td>
<td>5.8 (5.6)</td>
<td>0.25</td>
</tr>
<tr>
<td>No uveitis</td>
<td>100</td>
<td>7.8 (7.5)</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private (HMO, PPO)</td>
<td>90</td>
<td>7.6 (7.5)</td>
<td>0.79</td>
</tr>
<tr>
<td>Public (Medicaid, CareSource)</td>
<td>23</td>
<td>7.2 (6.5)</td>
<td></td>
</tr>
<tr>
<td>Visits in previous 6 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 6 visits</td>
<td>12</td>
<td>7.9 (7.5)</td>
<td>0.002</td>
</tr>
<tr>
<td>&gt; 6 visits</td>
<td>101</td>
<td>3.7 (3.4)</td>
<td></td>
</tr>
</tbody>
</table>

- No statistically significant difference was observed among JIA subtypes.
  - Enthesitis-related subtype had the highest mean JADAS value (10.7).
  - Persistent oligoarticular subtype had the lowest mean JADAS value (6.0).
- Patients who had more than six visits in six months had lower mean JADAS values than patients who had six or fewer visits in the same period (3.7 vs. 7.9, \( P = 0.002 \)).
- Patients who regularly used nonsteroidal anti-inflammatory drugs (NSAIDs) had higher mean JADAS values compared with patients not regularly using NSAIDs (10.1 vs. 6.3, \( P = 0.01 \)).
Comparison of JADAS Data from Cleveland Clinic and Italian Cohorts\textsuperscript{1} in Patients with Juvenile Idiopathic Arthritis

*Median JADAS values were higher in the Cleveland Clinic cohort due to increased parent global assessment scores.

Pa-GA scores were higher in the Cleveland Clinic JIA cohort compared with the Italian cohort. There was moderate correlation between Pa-GA and MD-GA (r = 0.50) in the Cleveland Clinic JIA cohort, yet the Pa-GA was an average of 1.7 times greater than the MD-GA. There was no correlation between Pa-GA and disease duration, disease subtype, presence of uveitis or medication use.

Prior work determined that a JADAS less than 5.24 indicates a 93 percent chance of inactive disease.\textsuperscript{2}

References


The JADAS is easily calculated during a clinical visit, and the score can inform providers about opportunities to improve the care of their JIA patients. Based on its JADAS data, the Center for Pediatric Rheumatology has implemented goals and interventions for 2012 to improve JADAS scores and outcomes for children with JIA.

*JADAS values for 47 patients (42 percent) were less than 5.2, indicating a high probability of inactive disease.
Goals and Interventions Implemented Based on JADAS Data

<table>
<thead>
<tr>
<th>Goal</th>
<th>Current Value</th>
<th>2012 Goal Score</th>
<th>% Reduction (Increase)</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease mean parent global assessment</td>
<td>3.3</td>
<td>2.3 (30)</td>
<td></td>
<td>Increase education through shared medical appointments and use of handbook for families with new diagnosis of JIA</td>
</tr>
<tr>
<td>Reduce daily NSAID use</td>
<td>50%</td>
<td>40 (20)</td>
<td></td>
<td>Implement electronic medical record flag when patient reports daily NSAID use</td>
</tr>
<tr>
<td>Increase number of monitoring visits in 6-month period</td>
<td>5.5</td>
<td>7.1 (30)</td>
<td></td>
<td>Standard of care will be follow-up visits every 4 weeks for patients with JADAS &gt; 5.3 and every 6 weeks for patients with JADAS &lt; 5.3</td>
</tr>
<tr>
<td>Decrease JADAS for enthesitis-related subtype</td>
<td>10.7</td>
<td>8.6 (20)</td>
<td></td>
<td>Implement multidisciplinary care pathway, including physical therapy, psychology and pain medicine</td>
</tr>
</tbody>
</table>

The center is proud to be the first to report JADAS scores for a clinical cohort of children with JIA in the United States. It will continue to monitor and report data as a metric of quality and outcomes for children with this potentially disabling condition.
Cleveland Clinic Center for Autism

Social Thinking Program

In response to the need for an empirically supported approach to teaching social thinking to children with high-functioning autism or Asperger’s disorder, Cleveland Clinic Center for Autism has developed the Social thinking Practice and Instruction Enhances Socialization (SPIES) program. The 20-week program includes child intervention, parent instruction and skill generalization, and culminates in a six-week inclusive summer camp.

Twenty-three children with high-functioning autism or Asperger’s disorder, aged 6 to 11 years, have participated in SPIES through the first three years of the program. The following data demonstrate a significant reduction in autism symptoms from the program’s beginning to its end; this included symptom reduction maintained over three years in some individuals. In many cases, SPIES participants showed typical symptom levels as a result of intervention.

Social Symptoms and Repetitive Behaviors Before and After SPIES Program Participation (N = 23)

2008 – 2011

![Graph showing social symptoms and repetitive behaviors before and after SPIES program participation.](image)
Lerner School Program

Students attending Cleveland Clinic Center for Autism’s Lerner School commonly demonstrate challenging behaviors, including aggression, self-injury, noncompliance and self-stimulation. These behaviors pose a safety risk and significantly interfere with students’ ability to learn, to acquire and to maintain skills. This is reflected in the fact that these students typically complete a small percentage of goals in their Individual Education Plan. To address this, our teachers implement a Behavior Intervention Plan, a systematic process that begins with identifying the function of the challenging behavior(s) and, based on the findings, designing an appropriate behavior plan(s). A behavior management committee oversees the process with follow-up monitoring through the duration of the plan. These data indicate that the behavior intervention process used by the Lerner School facilitates educational success, even in individuals with autism who have substantial challenging behavior.

Mean Percentage of Individual Education Plan Goals Completed by Students with Autism Undergoing Behavior Intervention (N = 34)

2011

<table>
<thead>
<tr>
<th>Mean Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>40</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

- No Behavior Intervention Plan
- Behavior Intervention Plan for One Challenging Behavior
- Behavior Intervention Plan for Two or More Challenging Behaviors
Speech/Language Services

Speech/language pathologists at the Center for Autism have developed a method of analyzing repetitive speech (echolalia), a common manifestation of social communication impairment in autism. Clinical practice commonly prescribes ignoring most repetitive speech in individuals with autism based on the assumption that it is not communicative, or minimally so. Utilizing an analysis that includes nonverbal behavior, contextual information and obtaining a history of apparent idiosyncratic communication, the center identified that a substantial proportion (65 percent) of this behavior in individuals with severe autism is communicative. Therefore, treatment should be designed to shape and to reinforce communicative behavior.

Percentage of Students with Severe Autism and Repetitive Speech Who Do or Do Not Show Communicative Intent (N = 11)

2011

<table>
<thead>
<tr>
<th>Percent</th>
<th>Without Communicative Intent</th>
<th>With Communicative Intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lerner School for Autism Preschool Placement Outcomes

The preschool program provides year-round early, intensive behavior intervention to young children who are diagnosed with autism spectrum disorder. Children as young as 18 months through 6 years of age receive 30 hours per week of intervention through partnership of the education team and the child’s parents. Utilizing the science of applied behavior analysis and child development principles, an individualized curriculum is designed to teach communication, social interaction, play, and a range of functional and adaptive skills.

Upon completion of participation in the preschool program, 38 percent of students were able to return to a less restrictive environment within their home school districts, requiring little or no external support from educational personnel in the school. The remaining 62 percent of students who left the preschool program required a substantial level of educational support in either a specialized program or in their home school district.

Degree of Educational Support Needed by Students with Autism at Exit from Preschool Program (N = 86)

2004 – 2011

Percentage of Students

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal or No Support</td>
<td></td>
</tr>
<tr>
<td>Substantial Ongoing Support</td>
<td>60%</td>
</tr>
</tbody>
</table>

Pediatric Institute & Children’s Hospital
Pediatric Behavioral Health

Social Skills Training for Children with ADHD

Cleveland Clinic Children’s Hospital for Rehabilitation offers social skills training for children with attention-deficit/hyperactivity disorder (ADHD).

- The program involves behavioral teaching of age-appropriate social skills to children and adolescents with ADHD.
- Children aged 6 years to 14 years meet in age-appropriate groups of six to eight children per group.
- Groups meet for 90 minutes per week for seven weeks, and sessions are facilitated by the ADHD Center for Evaluation and Treatment staff.
- Caregiver/parent coaching groups are offered simultaneously.
- Parents learn behavioral techniques and interventions.
- The following list illustrates examples of targeted skills:
  - initiating cooperative ventures
  - initiating conversation
  - participating in a group
  - interrupting appropriately
  - giving/accepting negative feedback
  - making/keeping friends
  - listening during conversation
  - following instructions/rules
  - solving problems/negotiating

Parents were asked to complete a Parent Satisfaction Questionnaire.

- Twenty parents of 20 Social Skills Program participants completed the questionnaire.
- The questionnaire assessed parent satisfaction and behavioral improvements of their children.
- Following are graphs depicting the results of the questionnaire. Noteworthy results include:
  - Ninety-five percent of parents identified the social skills training as above average.
  - Ninety percent of parents said their child made improvements towards their goal.
Parents’ Rating of Social Skills Training for Children with ADHD Aged 6 to 14 Years (N = 20)
2011

Skill Improvement Ratings of Children with ADHD Aged 6 to 14 Years (N = 20)
2011
Summer Treatment Program for Children with ADHD

Cleveland Clinic Children's Hospital for Rehabilitation offers a Summer Treatment Program (STP) that is designed for children aged 6 to 11 years with attention-deficit/hyperactivity disorder (ADHD). The seven-week program divides participants into groups of 10 to 12 children, based on age, and five clinical staff members supervise each group. In 2011, 40 children participated in the program, and all completed the program.

Benefits of the Program

- Daily social skills training from the child's counselors
- Four hours of recreation (swimming, soccer, baseball and basketball)
  - Learn sports skills that help them be successful with peers
  - Participate in group problem-solving discussions
- Two hours in a classroom setting to learn how to manage behavior in a school setting
- Parent training
  - Enhance behavior management at home and school
  - Follow-up “booster sessions” throughout the school year
- Medication assessments
- Continued research on ADHD

Parent Satisfaction Questionnaire

- Parents of the 40 STP participants completed the questionnaire.
- The questionnaire assessed parent satisfaction and behavioral improvements.
- Following are graphs depicting the results of the Parent Satisfaction Questionnaire.
  Noteworthy results:
  - Some 97 percent of parents identified STP as more effective than other treatments.
  - All parents (100 percent) stated they benefited from the program.
Extent to Which Child and Parent Benefited from Summer Treatment Program (N = 40) 2011

How Parents Rated Program’s Effectiveness and Their Level of Satisfaction Compared with Other Treatments (N = 40) 2011
Extent to Which Child Enjoyed Summer Treatment Program (N = 40)

Parents' Responses to: Would You Recommend or Re-send Your Child to the Summer Treatment Program? (N = 40)
Overall Behavioral Improvement of Children After Completion of Summer Treatment Program (N = 40)

2011

Percent

<table>
<thead>
<tr>
<th></th>
<th>Improved</th>
<th>Unchanged</th>
<th>Worsened</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
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<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
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<td></td>
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<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average Number of Daily Negative Verbalizations of Summer Program Participants by Age Group

2011

Number of Behaviors

<table>
<thead>
<tr>
<th></th>
<th>Ages 6-7 (N=10)</th>
<th>Ages 8-9 (N=10)</th>
<th>Ages 10-11 (N=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>6</td>
<td></td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>110</td>
</tr>
</tbody>
</table>

Treatment Week
Cleveland Clinic Children’s Hospital for Rehabilitation

**Average Number of Daily Positive Peer Interactions of Summer Treatment Program Participants by Age Group 2011**

---

**Summer Treatment Program for Adolescents with ADHD**

The Summer Treatment Program for Adolescents (STPA) is a seven-week program designed for children aged 11 to 14 years with attention-deficit/hyperactivity disorder (ADHD). The program divides participants into groups of 8 to 10 children, based on age, and five clinical staff members supervise each group. In 2011, two of 18 students who participated in the program were removed due to severe psychopathology, giving the STPA a completion rate of 89 percent.

**Benefits of the Program**

- Development of problem-solving skills, social skills and social awareness to improve interaction with peers
- Earning money (contingent upon behavior)
- Implementation of a parent-teen negotiation to manage behavior more effectively at home
- Two hours in the classroom setting
  - One hour of history — adolescents learn note-taking and test-taking techniques
  - One hour of strategies — adolescents learn how to efficiently manage time during a long-term project
- Parent training
  - Enhancing behavior management at home and school
  - Follow-up “booster sessions” throughout the school year
- Medication assessments
- Continued research on ADHD
Average Number of Daily Negative Behaviors in 11- to 14-Year Age Group in Summer ADHD Program (N = 15)

2011

Frequency of Behavior

<table>
<thead>
<tr>
<th>Frequency of Behavior</th>
<th>Treatment Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

Average Amount of Money Earned by 11- to 14-Year-Olds in Summer ADHD Program (N = 15)

2011

Number of Dollars

<table>
<thead>
<tr>
<th>Number of Dollars</th>
<th>Treatment Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>
Pediatric Feeding Program

Data were collected on all patients treated in the Pediatric Feeding Program from Jan. 1, 2009, through Dec. 31, 2011. To be included in the treatment group, patients had to meet the following criterion: either completion of nine consecutive months of treatment or 15 sessions (whichever came first), with a break of no more than six weeks between sessions. Data were collected at the following points: (1) after nine months or 15 sessions, (2) after 18 months or 30 sessions, and (3) at discharge if discharge occurred 18 months after initiation of treatment.

Patients were categorized into three treatment groups: general outpatient treatment (N = 108), intensive treatment (N = 15), and nasogastric/gastrostomy tube supplementation treatment (N = 30). Outcomes were compared within each group, as outlined below. All patients received treatment from an interdisciplinary team, including Psychology, Occupational Therapy and Nutrition. All data were measured at the initiation of treatment and at the established treatment intervals of nine months, 18 months and greater than 18 months.

General Outpatient Treatment Group. The 108 patients in the general outpatient treatment group were treated solely in the outpatient clinic. Patients in this group did not require nasogastric or gastrostomy tube feedings.

Nasogastric/Gastrostomy Tube (NG/GT) Supplementation Treatment Group. The 30 patients receiving supplemental NG/GT feedings were treated solely in the outpatient clinic by an interdisciplinary team from Psychology, Occupational Therapy and Nutrition.

Intensive Treatment Group. The 15 patients in the intensive treatment program received treatment five days per week, approximately six to seven hours per day, for a period of eight to 10 weeks. Treatment included four to six feeding sessions per day. These patients also typically received outpatient treatment before and/or after the intensive treatment program.
**Improved Growth**

**Weight for Age Below the Third Percentile**

*2009 – 2011*

### Percentage of Patients

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Initial Treatment Session</th>
<th>9 months of Treatment</th>
<th>18 months of Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Outpatient</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nasogastric and Gastrostomy Dependent</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Intensive Treatment</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

At initiation of treatment, 23 percent of patients in the general outpatient treatment group presented with weight for age below the third percentile on the Centers for Disease Control and Prevention (CDC) growth curve. After nine months of treatment, less than 10 percent of patients met this treatment criterion, and by 18 months, only 3 percent did.

Of the six patients below the third percentile at the start of treatment in the NG/GT supplementation group, only four were below the third percentile at nine months of treatment; one met this criterion by 18 months of treatment. All patients were above the third percentile at the time of discharge.

Of four patients initially growing below the third percentile on the weight-for-age curve, only one patient continued below the third percentile at the time of discharge from the intensive treatment program. During outpatient follow-up treatment nine months after completion of the intensive program, this patient was demonstrating adequate growth.
Weight for Length Below the Third Percentile
2009 – 2011

<table>
<thead>
<tr>
<th>Percentage of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial treatment session</td>
</tr>
<tr>
<td>General Outpatient</td>
</tr>
</tbody>
</table>

At initiation of treatment, 14 percent of patients in the general outpatient treatment group presented with weight for length or BMI below the third percentile on the CDC growth curve. After nine months of treatment, only 8 percent of patients still met this treatment criterion, and by 18 months, only 1 percent did. No patients discharged after 18 months of treatment were below the third percentile.

At initiation of treatment, two patients requiring tube feed supplementation presented with weight for length or BMI below the third percentile on the CDC growth curve. By 18 months of treatment, all patients were above the third percentile. One patient demonstrated a regression at the time of discharge.

At initiation of treatment, five of the 15 patients in the intensive treatment group presented with weight for length or BMI below the third percentile on the CDC growth curve. At discharge from the intensive treatment program, only two patients were below the third percentile for weight for length. During follow-up outpatient treatment nine months after completion of the intensive program, only one patient still met this treatment criterion. At the 18-month follow-up, all children in this treatment group demonstrated adequate BMI or weight for length.
Decreased Resistant Behaviors

Resistant feeding behaviors included aggression, intentional gagging and vomiting, tantrums, and spoon batting. Patients in all treatment groups demonstrated a steady reduction in resistant feeding behavior.

Percentage of Patients with Resistant Feeding Behaviors
2009 – 2011

Decreased Dependence on NG/GT Supplementation

To evaluate oral feeding/intake, patients’ percentage of total calorie intake provided from supplemental feeds was measured at initiation of treatment and at established treatment intervals.

Average Reduction of Nasogastric or Gastrostomy Tube Supplementation (N = 30)
2009 – 2011

At the initiation of NG/GT treatment, children were receiving an average of 87 percent of calories from supplemental tube feedings. By nine months of treatment, tube feeding had been weaned by an average of 21 percent. By 18 months of treatment, there was an additional 56 percent wean on average. All supplemental feeds were weaned at the time of discharge.
Pediatric Nephrology

Center for Comprehensive Pediatric Renal Care

The Judith M. Power Dialysis Center is in its ninth year of operation at Cleveland Clinic Children’s Hospital for Rehabilitation. The center provides pediatric hemodialysis and peritoneal dialysis services to infants, children, adolescents and young adults through 21 years of age. It is also the only pediatric dialysis center in northern Ohio affiliated with a pediatric transplant program.

The National Kidney Foundation’s Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines have been widely adopted in the United States. These guidelines and national benchmarks are used for quality improvement initiatives to enhance the outcomes of patients who develop end-stage kidney disease. The dialysis center has consistently exceeded these national dialysis quality measures since opening in 2003.

In the outcomes below, the sample size of 12 represents the dialysis center’s patient capacity. While the patient population is very stable, some patients did receive transplants and leave our care but were then replaced by other patients.

Hematocrit Monthly Averages

Hematocrit is monitored monthly per KDOQI measures to assess the proper dose administration of erythropoiesis-stimulating agents (darbepoetin alfa [Aranesp®] and epoetin alfa [Epogen®]) to patients.

Hematocrit Monthly Averages (Mean N = 12)

2010 – 2011

The monthly hematocrit averages of patients treated in the Power Dialysis Center have consistently remained better than the benchmark. However, in September 2010, the recall of Epogen and the treatment changes this necessitated impacted monthly averages on a temporary basis.
**Urea Reduction Ratio**

The urea reduction ratio (URR) measures the reduction in a patient's urea levels as a result of dialysis. The URR is one measure of how effectively dialysis treatment removes waste products from the body. The URR is expressed as a percentage and is measured monthly.

**Urea Reduction (Mean N = 12)**

*2010 – 2011*

**Percent of Urea Reduction**

*Benchmark*: National Kidney Foundation's Kidney Disease Outcomes Quality Initiative

URRs at the Judith M. Power Dialysis Center are higher than national benchmarks, demonstrating that the center has a highly effective process for dialysis treatments.
Fistula Rate

In patients with end-stage renal disease who are on dialysis, arteriovenous fistulas provide optimal access due to decreased opportunities for infection, as compared with exterior catheters.

Fistula Rate (Mean N = 12)
2010 – 2011

Infection Rates

Rates of infection are followed for every patient who received a catheter, arteriovenous fistula or arteriovenous graft. If a patient has symptoms that are related to infection, blood cultures and/or exit site cultures (for catheters) are obtained.

Dialysis Access Infection Rate (Mean N = 12)
2011

The Power Dialysis Center is proud to report an infection rate of zero for 2011, even with the increased use of dialysis catheters in the unit.
**Kt/V**

Kt/V is another way of measuring dialysis adequacy. The Kt/V is more accurate than the URR in measuring how much urea is removed during dialysis because it also considers the amount of urea removed with fluid loss. Consider two patients with the same URR and the same postdialysis weight, one with a weight loss of 1 kg (about 2.2 lbs) during treatment and the other with a weight loss of 3 kg (about 6.6 lbs). The patient who loses 3 kg will have a higher Kt/V, even though both have the same URR.

In this measurement:

- **K** stands for the dialyzer clearance, the rate at which blood passes through the dialyzer, expressed in milliliters per minute (mL/min)
- **t** stands for time
- **K x t** (the top part of the fraction) is clearance multiplied by time, representing the volume of fluid completely cleared of urea during a single treatment
- **V** represents the volume of water a patient’s body contains

Kt/V takes into account both urea generated by the body during dialysis and the extra urea removed along with fluid during dialysis. A higher number is better than a lower number.

**Kt/V (Mean N = 12)**

**2010 – 2011**

<table>
<thead>
<tr>
<th>Month</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Feb</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Mar</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Apr</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>May</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Jun</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Jul</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Aug</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Sep</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Oct</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Nov</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Dec</td>
<td>0.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>

*Benchmark: National Kidney Foundation’s Kidney Disease Outcomes Quality Initiative*
Pediatric Pain Rehabilitation Program

The Pediatric Pain Rehabilitation Program at Cleveland Clinic Children’s Hospital for Rehabilitation is a unique and innovative program designed for children and adolescents with chronic pain that interferes with normal activities. As a result of their pain, these children do not attend school, interact with peers or participate in normal activities. Our program focuses on helping children manage their pain and on restoring daily activity. It consists of inpatient and day hospital components, and blends pediatric subspecialty care, behavioral health and rehabilitation therapies in an individualized, but coordinated, manner.

In 2011, a total of 91 patients were seen, compared with 109 in 2010. This decrease in patient volume is attributed to (1) the increased complexity of patients admitted, resulting in a reduced number of patients seen to ensure quality of care, and (2) the temporary closure of our inpatient unit for repairs and improvements, leading to few or no patients seen over several weeks. Fifty-six percent of our patients were from out of state.

Pain Program Patient Volumes (N = 270)

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>2010</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>2011</td>
<td>60</td>
<td>30</td>
</tr>
</tbody>
</table>
Pain Program Primary Diagnoses by Year (N = 270)
2009 – 2011

Number of Patients

<table>
<thead>
<tr>
<th>Condition</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex Regional Pain Syndrome</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Cleveland Clinic Children's Hospital for Rehabilitation
Symptom reduction scores for outcome variables are calculated for each patient using the following formula:

Symptom reduction score = 100 x (pre-treatment score – post-treatment score/pre-treatment score)

These scores provide an index of improvement in various areas, reflected as an average percentage symptom reduction for that area. Two diagnostic tools are used: a pain severity rating (adolescent self-report) and the Bath Adolescent Pain Questionnaire (BAPQ), which has subscales of Physical Functioning, Pain-Specific Anxiety and Social Functioning.

Patients are asked to rate the pain they experienced during the past 24 hours on a scale of 0 (no pain) to 10 (maximum pain). Pain severity ratings are obtained at the beginning of the three-week pain rehabilitation program and at one-month follow-up. One-month follow-up assessment for 2011 revealed an average 19 percent decrease in pain severity.

The BAPQ, also self-reported by the adolescent, is a 61-item tool designed specifically to assess the multidimensional impact of chronic pain on adolescents. The BAPQ’s internal consistency, comparative validity and temporal reliability are well-established. The tool is administered at the beginning of the program, as well as one month following its completion. The Physical Functioning, Pain-Specific Anxiety and Social Functioning subscales are used in outcome analyses.
Patients reported an average 28 percent improvement in Social Functioning, based on the BAPQ data.

Patients in the pain program reported an average 52 percent improvement in Physical Functioning, based on the BAPQ data.

Pain program patients reported an average 36 percent decrease in Pain-Specific Anxiety, based on the BAPQ data.

Patients reported an average 28 percent improvement in Social Functioning, based on the BAPQ data.
Importantly, the pain program completed follow-up on the 288 patients treated in the first four years of the program (2007 to 2011) and found compelling evidence of sustained real-world improvement after program completion. At the 36- and 48-month follow-up visits, patients reported substantially less pain and almost no school days missed; their parents reported almost no missed workdays due to their child’s pain. At those follow-up visits, patients also reported almost no pain-related emergency room visits or hospital days.

### Pain Program’s Impact on Long-Term Functioning (N = 288)
2007 – 2011

- **Patient School/Workdays Missed per Week**
  - Admission
  - One year post-discharge
  - Two years post-discharge
  - Three years post-discharge
  - Four years post-discharge

- **Parent Workdays Missed per Week**

- **ER Visits/Days Hospitalized per Month**

- **Pain Ratings (0 to 10)**

- **Admission**:
  - 8
  - 6
  - 4
  - 2
  - 0

- **One year post-discharge**:
  - 8
  - 6
  - 4
  - 2
  - 0

- **Two years post-discharge**:
  - 8
  - 6
  - 4
  - 2
  - 0

- **Three years post-discharge**:
  - 8
  - 6
  - 4
  - 2
  - 0

- **Four years post-discharge**:
  - 8
  - 6
  - 4
  - 2
  - 0
Pediatric Inpatient Rehabilitation Program — WeeFIM Outcomes

The WeeFIM II® System, a pediatric version of the Functional Independence Measure™ (FIM) System, measures and tracks the development of functional independence. The system is used to document functional performance in children and adolescents with acquired or congenital disabilities by measuring a child’s need for assistance and the severity of disability. The WeeFIM also provides a method of evaluating outcomes for pediatric rehabilitation and habilitation programs.

The WeeFIM national database provides reports comparing individual programs against national benchmarks. The outcomes of children treated at Cleveland Clinic Children's Hospital for Rehabilitation compare favorably with national benchmarks.

Cleveland Clinic Children's Hospital for Rehabilitation Median WeeFIM Score at Discharge

Score: 18 (worst) to 126 (best)

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.

The WeeFIM score at discharge is calculated by adding the discharge scores for the 18 WeeFIM items. WeeFIM scores range from 18 to 126. A higher score is better than a lower score.
Cleveland Clinic Children’s Hospital for Rehabilitation

Cleveland Clinic Children's Hospital for Rehabilitation Median WeeFIM Score Change (Gain)

Gain in Points: 0 (no gain) to 126 (best gain)

The WeeFIM score change is calculated by subtracting the admission WeeFIM score from the discharge WeeFIM score. A higher score indicates more gain in function.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.

Cleveland Clinic Children’s Hospital for Rehabilitation Median Rehabilitation Length of Stay

The rehabilitation length of stay is calculated by subtracting the admission date from the discharge date. If any program interruptions are recorded, these off-service days are subtracted from the total length of stay. A lower number of days is better than a higher number.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.
Cleveland Clinic Children’s Hospital for Rehabilitation Median Length-of-Stay Efficiency Rate

This measure is the change in functional status per day spent in the rehabilitation program. The length-of-stay efficiency rate is calculated by dividing the change in WeeFIM score from admission to discharge (gain) by the number of days the child spent in the rehabilitation program. A higher rate is better than a lower one.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.

Cleveland Clinic Children’s Hospital for Rehabilitation Median Functional Quotient Score at Discharge

This measure represents the discharge functional quotient of the children who undergo rehabilitation at Children’s Hospital for Rehabilitation compared with children who undergo rehabilitation at similar facilities. Functional quotient is a methodology of age-adjusting the data and comparing an observed rating with an age-expected rating of a child without a disability. A higher functional quotient is better than a lower one.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.
Cleveland Clinic Children’s Hospital for Rehabilitation

Cleveland Clinic Children’s Hospital for Rehabilitation Functional Quotient Score Change (Gain)

Gain in Points: 0 (no gain) to 30 (most gain)

This measure represents the change in functional quotient (gain) between admission and discharge of children who undergo rehabilitation at Children’s Hospital for Rehabilitation compared with children who undergo rehabilitation in comparable programs elsewhere. A higher functional quotient score is better than a lower one.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.

Cleveland Clinic Children’s Hospital for Rehabilitation Median Therapy Unit Efficiency Rate

This rate is calculated by dividing the functional quotient score change by the total number of therapy units provided. A higher rate is better than a lower one.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.
The vast majority of children in the rehabilitation program at Children’s Hospital for Rehabilitation were discharged to their home communities. The community discharge rate is calculated by dividing the number of children undergoing rehabilitation who are discharged to a community setting by the number of all children undergoing rehabilitation in the program.

*The national benchmark is calculated from a database of WeeFIM performance measures of like facilities, housed by Uniform Data Systems.
Pediatric Rehabilitation Case Management Program

The Pediatric Rehabilitation Case Management Program provides comprehensive, supportive case management services for children who require inpatient rehabilitation as a result of multiple traumas, head injury, neurologic injury, spinal cord injury and other acute conditions needing functional restoration. The program works to ensure that children and their families have their health and developmental needs met at home, at school and in the community. It does this by ensuring continuity of care and facilitation of access to appropriate, cost-effective services for families of all income levels.

One of the case management program’s goals is to maintain children in their home environment and to provide services for them to remain in the community. In 2011, all patients in the program were assessed, received case management plans and were discharged to the community. Of the 40 children served by the program, none required re-hospitalization.

Age of Patients Served by Case Management Program (N = 40)

![Bar Chart: Age of Patients]

Income Level of Families with Patients in Case Management Program (N = 40)

![Bar Chart: Income Level]
Care Management Follow-up Appointment Data

2011

**Number of Appointments**

<table>
<thead>
<tr>
<th></th>
<th>Appointments Made</th>
<th>Appointments Kept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ninety-three percent of all appointments for medical, educational and social services scheduled through the Rehabilitation Case Management Program were kept.

Disposition of Case Management Program Patients as a Result of School Re-Entry Meetings (N = 34)

2011

**Number of Patients**

<table>
<thead>
<tr>
<th></th>
<th>IEP* in Place at Discharge</th>
<th>Regular Classroom Placement</th>
<th>Home Instruction Provided by School District</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*IEP = individualized education plan

During 2011, 21 school re-entry meetings were held with school district representatives and the hospital team, including the medical staff, nursing, therapy services, psychology and social work. Twelve children had individualized education plans in place at discharge, six received instruction in the home provided by their school district, and the remaining 16 children were placed in a regular classroom setting.
Cleveland Clinic is dedicated to delivering excellent clinical outcomes and the best possible experience for our patients and their families. Patient feedback is critical in driving priorities and assessing results. Based on this feedback, Cleveland Clinic's Office of Patient Experience implements training programs to improve service and communication as well as educational initiatives to help patients understand what to expect when they are in our care.

**Outpatient — Pediatric Institute & Children's Hospital**

**Overall Rating of Outpatient Care and Services During Outpatient Visit**

**2010 – 2011**

![Bar Chart]

Source: Press Ganey, a national hospital survey vendor
Rating of Outpatient Care Provider
2010 – 2011

Source: Press Ganey, a national hospital survey vendor

Likelihood of Recommending Outpatient Care Provider
2010 – 2011

Source: Press Ganey, a national hospital survey vendor
Inpatient — Pediatric Institute & Children’s Hospital

Overall Assessment
2010 – 2011

Percent

<table>
<thead>
<tr>
<th></th>
<th>Rate Care Given at This Hospital</th>
<th>Would Recommend This Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 (N = 252)</td>
<td>71%</td>
<td>73%</td>
</tr>
<tr>
<td>2011 (N = 385)</td>
<td>71%</td>
<td>76%</td>
</tr>
</tbody>
</table>

% Respondents choosing “very good”
Five-point scale: “very poor” to “very good”

Source: Press Ganey, a national hospital survey vendor
Pediatric Intensive Care Unit

Mobile Emergency Simulation Initiated in PICU

Just in Time (JIT) training, a form of mobile emergency simulation, was initiated in Cleveland Clinic Children’s Hospital’s PICU. This innovation involves once-weekly, on-the-spot training of the medical care team on how to handle anticipated emergencies. JIT training occurs within the actual workplace (PICU) and utilizes unoccupied patient rooms, allowing the environment to be as realistic as possible. This eliminates travel time for the healthcare professional, who goes from the patient care area directly to the simulation center. Training focuses on real-time patient scenarios based on the PICU patient population at the time of the simulation. It ideally prepares the team for the “what if” of real patient problems. JIT training occurs on different shifts to suit the needs of the staff. Some of the scenarios include arrhythmias, emergency procedures/equipment use, administration of special medications, preparation for extracorporeal membrane oxygenation cannulation, preparation for emergently opening the chest, and troubleshooting. The simulations are conducted and organized by pediatric nursing educators, along with PICU staff physicians.

The PICU simulation team is training documentation nurses to act as co-code leaders. The co-code leader will help the physician leader guide the management of the patient during a medical emergency in an effort to prevent errors and provide patient safety. The simulation exercises also focus on training nurses to speak up when any obvious errors are committed, to communicate effectively with other healthcare professionals and to communicate well with a patient’s family members, all with the goal of ensuring patient safety and satisfaction.

JIT training and regular simulation exercises have improved the PICU healthcare professionals’ awareness of impending emergency situations, confidence in managing critically ill patients, team communication and job satisfaction.
Pediatric Behavioral Health

Transfer to Action (In Affiliation with Notre Dame College)

Transfer to Action is a psychoeducational training program for incoming freshmen at Notre Dame College. It provides additional support and learning services for new and returning students. The 12-week series introduces skills such as acclimation to college, time management, effective study skills, relaxation techniques and developing overall student wellness. The group meets on alternate weeks for 45 minutes throughout the fall and spring semesters. Transfer to Action group members are affiliated with the Academic Support Center at Notre Dame College.

Program participants completed a questionnaire that asked which topics had been most helpful to them. Group members were also asked to rate various aspects of the program.

### 2011 Group Members’ Ratings of Transfer to Action Program (N=162)

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Above average</td>
<td>Average</td>
<td>Below average</td>
<td></td>
</tr>
<tr>
<td>Subject matter was clearly presented</td>
<td>95</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Topics were understood</td>
<td>92</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating of the group</td>
<td>92</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement toward goals</td>
<td>70</td>
<td>26</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Pediatric Institute & Children’s Hospital
Pediatric Endocrinology

Enhanced Medical Management of Adolescents with Insulin-Dependent Diabetes

The Enrichment Services and Care for Adolescents Living with Autoimmune Insulin-Dependent Type 1 Diabetes (ESCALAIT) Clinic is a shared medical appointment for Cleveland Clinic Children’s Hospital patients with type 1 diabetes. This clinic takes the place of the traditional diabetes clinic appointment, with the aim of improving a patient’s medical management.

Group visits are conducted approximately three months apart and include:

- brief education sessions
- adolescents-only and parents-only sessions with the clinic team
- a review of glucometer readings and adjustment of insulin doses to better engage adolescents
- individual exams, lab reviews and after-visit summaries

The ESCALAIT Clinic was started in January 2011 and has gradually continued to grow. To date, the clinic has had a total of 134 participants: 60 percent female and 40 percent male. Participants’ ages range from 10 years to 18 years, with 30 percent aged 10 years to 12 years and 70 percent aged 13 years to 18 years.

Due to the success of this clinic, the Pediatric Endocrinology Department recently has started a similar program for children with type 1 diabetes aged 5 years or younger entitled Junior ESCALAIT.
Cleveland Clinic Center for Autism

Creating Employment Opportunities for Individuals with Autism

With the growing incidence of autism, the corresponding increase in the number of students with autism graduating from high school exceeds available job training and employment resources. Employment opportunities for adults with autism are few to nonexistent. A recent report from the Autism Society of Ohio brings this fact into sharp focus, stating “the employment rate for individuals with disabilities, including autism, fell to 13 percent in November 2011, the lowest rate on record.”

Cleveland Clinic’s Center for Autism implemented a comprehensive, assessment-based vocational training program for high school students at the Lerner School through guided student internships. The program commences when students turn 14 years old and continues through to graduation. It is designed to systematically increase students’ vocational and equally important on-the-job skills, including behavior self-regulation, appropriate communication and personal presentation. Contrary to expectations, participation in the program did not lead to employment opportunities for our graduates. Furthermore, within a year after graduation, desperate parents called to report that their adult children were not using the vocational skills they had gained as students and were becoming increasingly aggressive as they languished in day programs. This behavior was carrying over to the home and community.

In response to this crisis, an initiative to create employment opportunities for the graduates became urgent. A new supported employment site was created at MedWish International, one of our job training sites, through a unique collaboration among the Center for Autism, MedWish International and Vocational Guidance Services Inc., a private, nonprofit vocational rehabilitation and job placement agency. To date, eight of 15 graduates from the Lerner School work at MedWish International, applying the skills they learned in high school and contributing to MedWish’s efforts “to save lives and promote better health.”
Outcomes 2011

The Pediatric Institute & Children’s Hospital staff authored more than 200 publications in 2011. For a complete list go to clevelandclinic.org/outcomes.

Center for Pediatric Allergy


Center for Pediatric Behavioral Health


**Center for Pediatric Hospital Medicine**


**Center for Pediatric Infectious Disease**


**Selected Publications**

**Center for Pediatric Nephrology**


**Center for Pediatric Neurology**


**Center for Pediatric Pulmonary Medicine**

Center for Pediatric Rheumatology & Immunology


Children's Hospital for Rehabilitation


General Pediatrics


Medical Subspecialty Pediatrics


**Neonatology**


**Pediatric & Congenital Heart Surgery**


Selected Publications


**Pediatric Anesthesiology**


**Pediatric Cardiology**


**Pediatric Critical Care Medicine**

Pediatric Gastroenterology


Pediatric Hematology and Oncology


**Pediatric Surgery**


Staff Listing

Institute Leadership

Giovanni Piedimonte, MD
Chairman, Cleveland Clinic Pediatric Institute & Children’s Hospital
Effective: August 2012

Ricardo Rodriguez, MD
Interim Chairman, Cleveland Clinic Pediatric Institute & Children’s Hospital
Chairman, Department of Neonatology

Steve Davis, MD
Vice Chairman, Pediatric Institute
Chairman, ICU Integration Team

Michael J. McHugh, MD
Vice Chairman, Pediatric Institute
Medical Director, Cleveland Clinic Children’s Hospital
for Rehabilitation

Vera F. Hupertz, MD
Vice Chairman of Quality & Safety

Amrit Gill, MD
Institute Patient Safety Officer

Lara Danzinger-Isakov, MD
Director, Pediatric Clinical Research

Allison Brindle, MD
Director, Pediatric Residency Program

Some physicians may practice in multiple locations. For a detailed list including staff photos, please visit clevelandclinic.org/staff
Special Children’s Hospital Programs

ADHD Center for Evaluation and Treatment
216.445.7574
Adoption Program
216.445.3033
Center for Autism
216.448.6440
Dialysis Unit
216.448.6193
Feeding Disorders Program
216.448.6024
Fetal Care Center
866.864.0430
Metabolic Services
216.444.3303
Nephrology Clinic
216.444.6123
Pain Rehabilitation Program
216.448.6035
Palliative Medicine Service
216.445.1404
Therapy Services (OT, PT, SLT and Motor Control programs)
New patients: 216.636.5437
Appointments:
Shaker Campus
216.448.6170
East (Beachwood)
216.593.0113
South (Middleburg Heights)
440.826.0102
West (Westlake)
440.835.7400

Adolescent Medicine
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Laura Gillespie, MD

Allergy and Immunology
Al Melton Jr., MD
Head
Velma Paschall, MD
Brian Schroer, MD

Anesthesiology
Stephen Kimatian, MD
Chairman
Alina Bodas, MD
Pilar Castro, MD
Glenn E. DeBoer, MD
Tara Hata, MD
Rami Karroum, MD
Sara Lozano, MD
Dorothea A. Markakis, MD
Marco Maurtua, MD
Julie J. Niezgoda, MD
Nelson Riveros, MD
Shelly Anne Rodriguez, MD
Kenneth J. Saliba, DO
John Seif, MD
Wai W. Sung, MD
E. Christian Tucker, MD
Staff Listing

**Autism**
Aletta Sinoff, PhD  
*Director*
Thomas Frazier, PhD  
*Research Director*
Leslie Speer, PhD

**Behavioral Health, Pediatric**
Michael J. Manos, PhD  
*Head*
Joseph Austerman, DO
Gerard A. Banez, PhD
Meghan Barlow, PhD
Ethan Benore, PhD
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**Bone Marrow/Stem Cell**  
216.444.0663
**Cornea**  
216.444.2020
**Heart**  
216.444.3083
**Intestine/Small Bowel**  
216.445.1191
**Kidney**  
216.448.6420
**Liver**  
216.444.8770
**Lung**  
216.445.1869

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Nancy Van Keuls, MD
Karen S. Vargo, MD
Robert Weiss, MD
Steven Wexberg, MD
Gary Williams, MD
General Patient Referral
24/7 hospital transfers or physician consults
800.553.5056

Cleveland Clinic Children’s Hospital, Main Campus
216.444.DOCS (3627) or 800.553.5056

Cleveland Clinic Children’s Hospital for Rehabilitation, Shaker Campus
216.448.6400 or 800.635.2417

Outpatient Appointments/Referrals
Medical and Surgical Subspecialties, Main Campus
216.444.DOCS (3627) or 800.553.5056

On the Web at clevelandclinicchildrens.org
To find a pediatrician at a Cleveland Clinic Family Health Center near you, visit clevelandclinicchildrens.org/staffdirectory

Cleveland Clinic Children’s Hospital for Rehabilitation, Shaker Campus
Inpatient Admissions and Day Hospital
216.448.6035

Outpatient Medical Clinic Appointments/Referrals
216.448.6179

Center for Autism
216.448.6440

Dialysis Appointments
216.448.6193

Feeding Disorders Program
216.448.6024

Nephrology Clinic
216.444.6123

OT/PT/SLT and Motor Control Programs
216.636.KIDS (5437)

Pain Rehabilitation Program
216.448.6035

Additional Contact Information

General Information
216.444.2200

Hospital Patient Information
216.444.2000

General Patient Appointments
216.444.2273 or 800.223.2273

Request for Medical Records
216.444.2640 or 800.223.2273, ext. 42640

Referring Physician Center and Hotline
Cleveland Clinic's Referring Physician Center has established a 24/7 hotline — 855.REFER.123 (855.733.3712) — to streamline access to our array of medical services. Contact the Referring Physician Hotline for information on our clinical specialties and services, to schedule and confirm patient appointments, for assistance in resolving service-related issues, and to connect with Cleveland Clinic specialists.

Medical Concierge
Complimentary assistance for out-of-state patients and families
800.223.2273, ext. 55580, or email medicalconcierge@ccf.org
Global Patient Services/International Center
Complimentary assistance for international patients and families
001.216.444.8184 or visit clevelandclinic.org/gps

Cleveland Clinic Florida
Toll-free 866.293.7866

For address corrections or changes, please call
800.890.2467

Cleveland Clinic Main Campus
9500 Euclid Ave.
Cleveland, OH 44195
216.444.DOCS (3627)

Shaker Campus
2801 Martin Luther King Jr. Drive
Cleveland, OH 44104
216.448.6400

Fairview Pediatric Subspecialty Clinic
18099 Lorain Ave., Suite 233
Cleveland, OH 44111
216.476.4420

Hillcrest Pediatric Subspecialty Clinic
6770 Mayfield Road, Suite 220
Mayfield Heights, OH 44124
440.312.7223

Therapy Services
Therapy Services – Main
2801 Martin Luther King Jr. Drive
Cleveland, OH 44104
216.448.6170

Therapy Services – West
826 Westpoint Parkway, Suite 1200
Westlake, OH 44145
440.835.7400

Therapy Services – South
17800 Jefferson Park Road, Suite 101
Middleburg Heights, OH 44130
440.826.0102

Therapy Services – East
3355 Richmond Road, Suite 101A
Beachwood, OH 44122
216.593.0113

Family Health Centers
Avon Lake Family Health Center
450 Avon Belden Road
Avon Lake, OH 44012
440.930.6800

Avon Pointe Family Health Center
36901 American Way
Avon, OH 44011
440.930.6250

Beachwood Family Health and Surgery Center
26900 Cedar Road
Beachwood, OH 44122
216.839.3000

Brunswick Family Health Center
3574 Center Road
Brunswick, OH 44212
330.225.8886
Institute Locations

Elyria Family Health and Surgery Center
303 Chestnut Commons Drive
Elyria, OH 44035
440.366.9444

Independence Family Health Center
Crown Centre II
5001 Rockside Road
Independence, OH 44131
216.986.4000

Lorain Family Health and Surgery Center
5700 Cooper Foster Park Road
Lorain, OH 44053
440.204.7400

Richard E. Jacobs Health Center
33100 Cleveland Clinic Blvd.
Avon, OH 44011
440.695.4000

Solon Family Health Center
29800 Bainbridge Road
Solon, OH 44139
440.519.6800

Stephanie Tubbs Jones Health Center
13944 Euclid Ave.
East Cleveland, OH 44112
216.767.4242

Strongsville Family Health and Surgery Center
16761 SouthPark Center
Strongsville, OH 44136
440.878.2500

Twinsburg Family Health and Surgery Center
8701 Darrow Road
Twinsburg, OH 44087
330.888.4000

Willoughby Hills Family Health Center
2570 SOM Center Road
Willoughby Hills, OH 44094
440.943.2500

Wooster Family Health Center
1740 Cleveland Road
Wooster, OH 44691
330.287.4500

Cleveland Clinic Children’s Hospital
Community Hospital Locations

Fairview Hospital
18101 Lorain Ave.
Cleveland, OH 44111
216.444.KIDS (5437)

Hillcrest Hospital
6780 Mayfield Road
Mayfield Heights, OH 44124
216.444.KIDS (5437)

Medina Hospital
1000 E. Washington St.
Medina, OH 44256
330.725.1000
Other Locations

Cleveland Clinic Children's Hospital Pediatric Cardiology at Ashtabula County Medical Center
2420 Lake Ave.
Ashtabula, OH 44004
440.997.2262

Cleveland Clinic Children's Hospital Pediatric Cardiology in Canton
4848 Higbee Ave. NW
Canton, OH 44718
330.492.7827

Cleveland Clinic Fairview Westown Plaza
10654 Lorain Ave.
Cleveland, OH 44111
216.941.8888

Cleveland Clinic Medical Office
5 Severance Circle
Cleveland Heights, OH 44118
216.297.2559

Cleveland Clinic Sports Health Center
5555 Transportation Blvd.
Garfield Heights, OH 44125
877.440.TEAM (8326)

Community Pediatrics, Chesterland
8254 Mayfield Road, Suite 1
Chesterland, OH 44026
440.729.0100

Community Pediatrics, Fairview Park
20800 Addington Blvd., Suite 400
Fairview Park, OH 44126
440.356.2272

Community Pediatrics, North Olmsted
24700 Lorain Ave.
North Olmsted, OH 44070
440.716.9810

Community Pediatrics, Westlake
805 Columbia Road, Suite 102
Westlake, OH 44145
440.808.1925

Lake West
36100 Euclid Ave., Suite 280
Willoughby, OH 44094
440.918.4640

Millersburg
981 Wooster Road
Millersburg, OH 44654
330.674.1015

Parma Medical Arts Center
7007 Powers Blvd., Suite 201
Parma, OH 44129
440.743.2001

Pediatric Sleep Center at Fairhill
11203 Stokes Blvd.
Cleveland, OH 44104
216.444.2165
Overview

Cleveland Clinic is a nonprofit multispecialty academic medical center that integrates clinical and hospital care with research and education. Across the health system, 2,800 Cleveland Clinic physicians and scientists practice in 120 medical specialties and subspecialties, annually recording more than 4.6 million physician visits and nearly 188,000 surgeries. Patients come for treatment from every state and from more than 125 countries annually.

Cleveland Clinic's main campus, with 50 buildings on 180 acres in Cleveland, Ohio, includes a 1,400-bed hospital, outpatient clinic, specialty institutes, and supporting labs and facilities. The hospital currently has the highest CMS case-mix index in America. Cleveland Clinic also operates 18 family health centers, eight community hospitals, one affiliate hospital, a rehabilitation hospital for children, Cleveland Clinic Florida, Cleveland Clinic Lou Ruvo Center for Brain Health in Las Vegas, Cleveland Clinic Canada, and Sheikh Khalifa Medical City. Cleveland Clinic Abu Dhabi (United Arab Emirates), a multispecialty care hospital and clinic, is scheduled to open in 2013. With 41,000 employees, Cleveland Clinic is the second largest employer in Ohio and is responsible for an estimated $9 billion of economic activity every year.

The Cleveland Clinic Model

Cleveland Clinic was founded in 1921 by four physicians who had served in World War I and hoped to replicate the organizational efficiency of military medicine. The organization has grown through the years by adhering to the model set forth by the founders. All Cleveland Clinic staff physicians receive a straight salary with no bonuses or other financial incentives. The hospital and physicians share a financial interest in controlling costs, and profits are reinvested in research and education.

In 2007, Cleveland Clinic restructured its practice, bundling all clinical specialties into integrated practice units called institutes. An institute combines all the specialties surrounding a specific organ or disease system under a single roof. Each institute has a single leader and focuses the energies of multiple professionals on the patient. Institutes are improving the patient experience at Cleveland Clinic.
Cleveland Clinic Lerner Research Institute

At the Lerner Research Institute, hundreds of principal investigators, project scientists, research associates and postdoctoral fellows are involved in laboratory-based, translational and clinical research. Total research expenditures from external and internal sources exceeded $240 million in 2010. Research programs include cardiovascular, cancer, neuralgic, musculoskeletal, allergic and immunologic, eye, metabolic, and infectious diseases.

Cleveland Clinic Lerner College of Medicine

Celebrating its 10th anniversary in 2012, the Lerner College of Medicine of Case Western Reserve University is known for its small class size, unique curriculum and full-tuition scholarships for all students. The program graduated 31 students as physician investigators in 2011.

Graduate Medical Education

In 2011, nearly 1,800 residents and fellows trained at Cleveland Clinic and Cleveland Clinic Florida, the most ever hosted by Cleveland Clinic and part of a continuing upward trend.

U.S. News & World Report Ranking

Cleveland Clinic is consistently ranked among the top hospitals in America by U.S. News & World Report, and our heart and heart surgery program has been ranked No. 1 since 1995.

For more information about Cleveland Clinic, please visit clevelandclinic.org.
Outcomes 2011

**Referring Physician Center and Hotline**

Cleveland Clinic’s Referring Physician Center has established a 24/7 hotline – 855.REFER.123 (855.733.3712) – to streamline access to our array of medical services. Contact the Referring Physician Hotline for information on our clinical specialties and services, to schedule and confirm patient appointments, for assistance in resolving service-related issues, and to connect with Cleveland Clinic specialists.

**Remote Consults**

Online medical second opinions from Cleveland Clinic’s MyConsult are particularly valuable for patients who wish to avoid the time and expense of travel. Cleveland Clinic offers online medical second opinions for more than 1,000 life-threatening and life-altering diagnoses. For more information, visit clevelandclinic.org/myconsult, email eclevelandclinic@ccf.org or call 800.223.2273, ext. 43223.

**Request Medical Records**

216.444.2640 or 800.223.2273, ext. 42640

**Track Your Patient’s Care Online**

DrConnect offers referring physicians secure access to their patients’ treatment progress while at Cleveland Clinic. To establish a DrConnect account, visit clevelandclinic.org/drconnect or email drconnect@ccf.org.

**Medical Records Online**

Cleveland Clinic continues to expand and improve electronic medical records (EMRs) to provide faster, more efficient and accurate care by sharing patient data through a highly secure network. Patients using MyChart can renew prescriptions and review test results and medications from their personal computers. MyChart provides a link to Microsoft HealthVault, a free online service that helps patients securely gather and store health information. It connects to Cleveland Clinic’s social media and Internet site, currently the most visited hospital website in America. For more information, visit clevelandclinic.org/mychart.

**Critical Care Transport Worldwide**

Cleveland Clinic’s critical care transport team and fleet of mobile ICU vehicles, helicopters and fixed-wing aircraft serve critically ill and highly complex patients across the globe. To arrange a transfer for STEMI (ST elevated myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage) or aortic syndrome, call toll-free 877.379.CODE (2633).

For all other critical care transfers, call 216.444.8302 or 800.553.5056.

**CME Opportunities: Live and Online**

Cleveland Clinic’s Center for Continuing Education operates one of the largest and most successful CME programs in the country. The Center’s website (ccfcme.com) is an educational resource for healthcare providers and the public. Available 24/7, it houses programs that cover topics in 30 areas – if not from A to Z, at least from Allergy to Wellness – with a worldwide reach. Among other resources, the website contains a virtual textbook of medicine (Disease Management Project) and myCME, a system for physicians to manage their CME portfolios. Live courses, however, remain the backbone of the Center’s CME operation. Most live courses are held in Cleveland, but outreach plans are under way. In 2011, the Center offered 15 simultaneous courses at Arab Health, a major world healthcare forum.
This project would not have been possible without the commitment and expertise of a team led by Vera Hupertz, MD, and Bryant M. Bond.