

Pediatric Institute & Cleveland Clinic Children's



Measuring Outcomes Promotes Quality Improvement





Measuring and understanding outcomes of medical treatments promotes quality improvement. Cleveland Clinic has created a series of Outcomes books similar to this one for its clinical institutes. Designed for a physician audience, the Outcomes books contain a summary of many of our surgical and medical treatments, with a focus on outcomes data and a review of new technologies and innovations.

The Outcomes books are not a comprehensive analysis of all treatments provided at Cleveland Clinic, and omission of a particular treatment does not necessarily mean we do not offer that treatment. When there are no recognized clinical outcome measures for a specific treatment, we may report process measures associated with improved outcomes. When process measures are unavailable, we may report volume measures; a relationship has been demonstrated between volume and improved outcomes for many treatments, particularly those involving surgical and procedural techniques.

In addition to these institute-based books of clinical outcomes, Cleveland Clinic supports transparent public reporting of healthcare quality data. The following reports are available to the public:

- Joint Commission Performance Measurement Initiative (qualitycheck.org)
- Centers for Medicare and Medicaid Services (CMS) Hospital Compare (medicare.gov/hospitalcompare), and Physician Compare (medicare.gov/PhysicianCompare)
- Cleveland Clinic Quality Performance Report (clevelandclinic.org/QPR)

Our commitment to transparent reporting of accurate, timely information about patient care reflects Cleveland Clinic's culture of continuous improvement and may help referring physicians make informed decisions.

We hope you find these data valuable, and we invite your feedback. Please send your comments and questions via email to:

OutcomesBooksFeedback@ccf.org.

To view all of our Outcomes books, please visit clevelandclinic.org/outcomes.



Dear Colleague:

Welcome to this 2016 Cleveland Clinic Outcomes book. Every year, we publish Outcomes books for 14 clinical institutes with multiple specialty services. These publications are unique in healthcare. Each one provides an overview of medical or surgical trends, innovations, and clinical data for a particular specialty over the past year. We are pleased to make this information available.

Cleveland Clinic uses data to manage outcomes across the full continuum of care. Our unique organizational structure contributes to our success. Patient services at Cleveland Clinic are delivered through institutes, and each institute is based on a single disease or organ system. Institutes combine medical and surgical services, along with research and education, under unified leadership. Institutes define quality benchmarks for their specialty services and report on longitudinal progress.

All Cleveland Clinic Outcomes books are available in print and online. Additional data are available through our online Quality Performance Reports (clevelandclinic.org/QPR). The site offers process measure, outcome measure, and patient experience data in advance of national and state public reporting sites.

Our practice of releasing annual Outcomes books has become increasingly relevant as healthcare transforms from a volume-based to a value-based system. We appreciate your interest and hope you find this information useful and informative.

Sincerely,

Delos M. Cosgrove, MD
CEO and President

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Chairman's Letter

Dear Colleagues,

Thank you for your interest in Cleveland Clinic Children's 2016 outcomes. This annual publication exemplifies our commitment to monitoring and reporting outcomes to continuously improve patient care.

We are proud to report, in addition to the outcomes throughout this book, the following developments at Cleveland Clinic Children's over the past year:

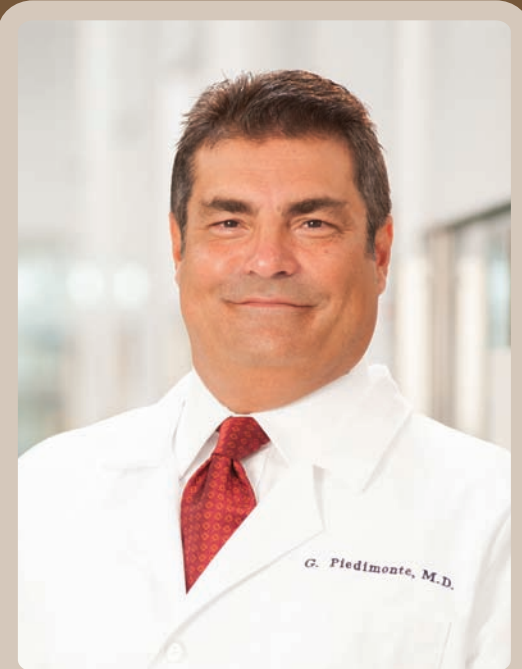
- Successfully using 3-D printing to help congenital cardiologists and cardiothoracic surgeons plan for percutaneous or surgical interventions
- Achieving a high rate of accuracy in diagnosing autism using an index based on measurements of remote eye gaze tracking in response to visual stimuli
- Implementing a new multimodal approach to managing postoperative pain to improve patients' pediatric orthopaedic surgery experiences
- Establishing a Pediatric and Adult Colorectal Surgery Clinic to help transition young patients with colorectal disorders to adult care
- Expanding our pediatric endocrinology program under the leadership of the new Head of Pediatric Endocrinology, Roy Kim, MD
- Offering bone marrow transplant as a cure for sickle cell disease and thalassemia
- Increasing access to our care through innovative solutions such as walk-in quick Strep tests, online Express Care, shared medical appointments, and a mobile care unit

We welcome your feedback, questions, and ideas for collaboration. Please contact me via email at OutcomesBooksFeedback@ccf.org and reference the Cleveland Clinic Children's book in your message.

Sincerely,



Giovanni Piedimonte, MD
Chairman, Pediatric Institute
Physician-in-Chief, Cleveland Clinic Children's
President, Cleveland Clinic Children's Hospital for Rehabilitation





Cleveland Clinic has cared for infants, children, and adolescents since its doors first opened in 1921. That history of pediatric caregiving has blossomed into Cleveland Clinic Children's standing today as one of America's leading and largest providers of comprehensive pediatric care. In 2016, Cleveland Clinic Children's was named as a national leader in clinical care by *U.S. News & World Report* in its 2016-2017 edition of "Best Children's Hospitals," with nine pediatric specialties ranked among the nation's best children's hospitals.

This reputation stems from premier programs in a wide range of subspecialties, including:

- Rehabilitation, featuring one of the nation's few freestanding rehab hospitals for pediatric patients and the world's only Pediatric Pain Rehabilitation Program accredited by the Commission on Accreditation of Rehabilitation Facilities
- Transplantation, offering the ability to perform any type of transplant — all solid organ types, dual-organ, multivisceral, cellular, and composite tissue — in pediatric patients
- Gastroenterology, leveraging unsurpassed volume and expertise in pediatric inflammatory bowel disease
- Cardiology and heart surgery, where pediatric specialists collaborate with their adult-care Cleveland Clinic colleagues to manage all aspects of the most complex cases of congenital heart disease and ensure superb continuity of care into adulthood
- Surgery, offering a breadth and depth of surgical expertise and resources that few children's hospitals can match

Cleveland Clinic Children's deep roots support far-reaching branches: Its more than 300 pediatricians, practitioners and specialists provide the full spectrum of primary, specialty, and subspecialty care to the largest patient population of any children's hospital in Northeast Ohio. This is accomplished through an integrated network comprising the children's hospital on Cleveland Clinic's main campus, Cleveland Clinic Children's Hospital for Rehabilitation, and several regional hospitals — which collectively contain 429 staffed pediatric beds — plus more than 50 outpatient sites.

Cleveland Clinic Children's Major Departments and Centers

Adolescent Medicine	Neonatology
Allergy and Immunology	Nephrology
Anesthesiology	Neurology and Neurosurgery
Child Life Services	Ophthalmology
Critical Care Medicine/Pediatric ICU	Orthopaedic Surgery and Sports Medicine
Dermatology	Otolaryngology
Endocrinology	Palliative Medicine
Fetal Care/Special Delivery Unit	Plastic Surgery
Gastroenterology	Pulmonary Medicine
General Pediatrics	Rehabilitation — Children's Hospital for Rehabilitation
General Surgery	• Department of Physical Medicine and Rehabilitation
Genetics	• Center for Therapy Services
Heart Disease — Pediatric and Congenital	• Center for Developmental and Rehabilitative Pediatrics
Hematology, Oncology, and Blood & Marrow Transplantation	• Center for Pediatric Behavioral Health
Hospital Medicine	• Center for Autism
Imaging	Rheumatology
Infectious Diseases	Transplantation
Integrative Medicine	Urology

Institute Overview

Outpatient Visits by Department or Center	
Allergy	5245
Behavioral Health	14,688
Cancer Center	6370
Cardiology	7929
Dermatology	9577
Emergency Medicine	89,213
Endocrinology	6504
Express Clinic	21,556
Gastroenterology	9427
General Pediatrics	301,222
Head and Neck	12,857
Hospital Medicine	8074
Infectious Diseases	813
Neonatology	587
Nephrology	1182
Neurosciences	19,167
Obstetrics and Gynecology	5757
Ophthalmology	22,995
Orthopaedics	18,895
Pain Management	433
Pediatric Rehabilitation	2644
Physical, Occupational, and Speech Therapy	90,283
Podiatry	916
Pulmonary Medicine	4860
Rheumatology	2366
Surgery	3809
Urology	3404
Other	15,999
Total outpatient visits	686,772

Surgical Cases	
General surgery	1092
Cardiothoracic surgery	237
Total cases	1329

Pediatric Cardiology Procedures	
Cardiac catheterization procedures	470
Pediatric echocardiograms	6869
Total cases	7339

Pediatric Gastroenterology Procedures	
Pediatric endoscopy	886
Other diagnostic procedures	1663
Total cases	2549

Patient Days	
Hospital	38,756
NICU	23,624
PICU	5669
Total days	68,049

Pediatric Allergy Quality Improvement/Safety Project: Establishment of a Cutoff Allergy Test Result to Guide Performance of Baked Egg Food Challenge Tests in Children With Egg Allergy

Egg allergy is among the more common food allergies in children and can result in significant dietary restrictions. Fortunately, most children with egg allergy eventually tolerate the food as they grow older. Prior to ultimate tolerance of straight eggs, many children will first develop tolerance to baked goods where egg is a listed ingredient. This tolerance provides expanded dietary options for these children, and regular consumption of this type of baked egg may accelerate ultimate tolerance of straight eggs. Food challenge testing currently represents the standard of care for assessment of food allergy status, aided by history, physical exam, and percutaneous and serum allergy tests. Correlation studies comparing straight egg challenge results with serum egg-specific immunoglobulin E (IgE) (ImmunoCAP® method) concentrations predict an approximate 95% likelihood for a clinical allergic reaction if an older child has an ImmunoCAP result of 7 kU/L, or if a child < 2 years has a result of 2 kU/L. These represent suggested cutoff results, above which challenge testing is not recommended without a history of recent tolerance of an accidental exposure. Similar correlative data for baked egg challenges are not as strong, and an ImmunoCAP result as high as 20 kU/L has been suggested as the recommended cutoff value. The Allergy Clinic reviewed the baked egg challenge experience over 2 years (2015–2016) to determine the reaction rates at various ImmunoCAP values in order to give parents information to help in their decision-making, and to determine whether another cutoff ImmunoCAP value is safer and more appropriate.

Baked Egg Challenge (N = 50)

2015 – 2016

Year	Passed	Reactions	Reaction Rate	Reactions Requiring Epinephrine
2015 (N = 27)	18	9	33%	0
2016 (N = 23)	13	10	43%	2
Total (N = 50)	31	19	38%	2

This is the highest reaction rate observed for any food challenge source in the Allergy Clinic's experience.

Baked Egg Reaction Relative to Baseline ImmunoCAP Titers in kU/L (N = 50)

2015 – 2016

ImmunoCAP Titers in kU/L	Number of Patients	Passed	Reactions	Reaction Rate (%)
< 0.35 – 1.00	10	9	1	10.0
1.01 – 2.00	12	9	3	25.0
2.01 – 4.00	8	7	1	12.5
4.01 – 10.00	9	3	6	66.7
10.01 – 20.00	9	2	7	77.8
> 20.00	2	1	1	50

If reactions are stratified based on an IgE value of 4.0 kU/L, then 30 total challenges \leq 4.0 had 5 reactions, for a reaction rate of 16.7%. Above 4.0, 20 total challenges had 14 reactions, for a reaction rate of 70%. In general, this is a safe procedure, with only 2 reactions needing epinephrine, but the IgE results for these 2 were at 1.05 kU/L in a 9-year-old and 18.80 kU/L in a 7-year-old. Interestingly, age did not correlate with reaction rates: 13 children < 2 years were challenged, and 3 reacted (23.1%). All 3 had a radioallergosorbent test > 4.0 kU/L, as did 1 child who didn't react.

Based on these results, the allergy clinic will inform parents of reaction rates for baked egg challenges.

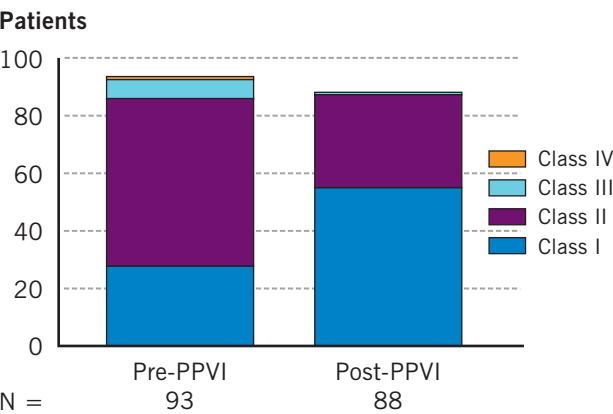
Catheterization Quality Outcomes

Percutaneous Pulmonary Valve Implantation Program

Percutaneous pulmonary valve implantation (PPVI) is a less invasive alternative to surgery in patients who have right ventricular outflow tract or right ventricle to pulmonary artery conduit failure, and has comparable outcomes. The two percutaneous valves currently FDA-approved for use in the pulmonary position are the Medtronic Melody® Transcatheter Pulmonary Valve and the Edwards SAPIEN™ Pulmonic Transcatheter Heart Valve. The Edwards SAPIEN 3 valve, approved for use in the aortic position, has also been placed in the pulmonary position. Since the beginning of the PPVI program in 2010, the pediatric cardiology staff has implanted percutaneous pulmonary valves in 94 patients, resulting in a substantial improvement in patients' symptoms based on the New York Heart Association functional classification status.

NYHA Functional Classification^a

2010 – 2016



NYHA = New York Heart Association, PPVI = percutaneous pulmonary valve implantation

^aThe NYHA functional classification statuses are:

Class I — No limitation of physical activity

Class II — Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, or shortness of breath.

Class III — Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or shortness of breath.

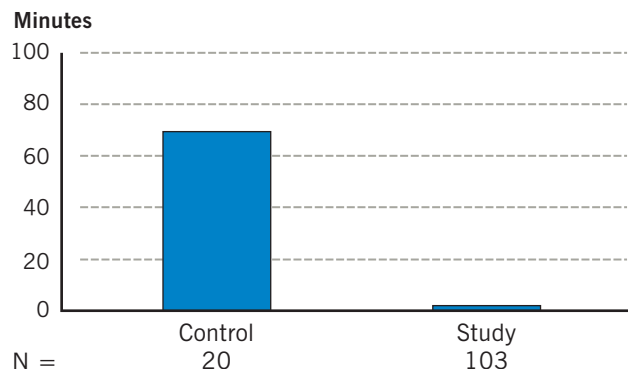
Class IV — Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest.

Electrophysiology Lab Quality Outcomes

Radiation exposure related to medical procedures carries known medical risk, which is dose-dependent and cumulative over time. Electrophysiology (EP) and catheter ablation procedures are traditionally performed under fluoroscopic guidance.¹⁻³ Three-dimensional electroanatomical navigation systems decrease or eliminate fluoroscopy use in EP procedures. Cleveland Clinic Children's adopted a strategy to reduce fluoroscopy exposure in these procedures and subsequently examined this approach to determine the safety and efficacy of catheter ablation compared with the traditional fluoroscopic approach. A total of 103 pediatric patients underwent catheter ablations for supraventricular arrhythmias with minimal fluoroscopy and 3-D electroanatomical mapping using the CARTO® 3 System between October 2012 and December 2016. The pediatric cardiology staff selected 20 age-matched patients who underwent ablations for supraventricular tachycardia by the same operator before October 2012 with the standard fluoroscopic approach as the control group. The graphs below demonstrate the reduction in fluoroscopy time and exposure in the study group. Among the patients in the study group, 58 patients (56%) had no fluoroscopy exposure. No major complications (pericardial effusion, heart block, thromboembolism, coronary damage) occurred in either group.

Fluoroscopy Time — Study Group vs Control Group (N = 123)

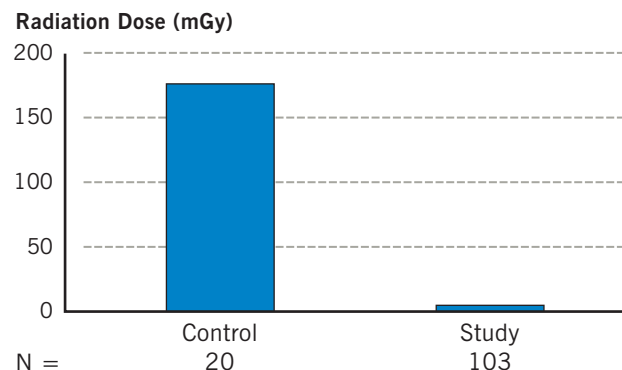
October 2012 – December 2016



Average fluoroscopy time for the control group was 69.2 minutes vs 1.9 minutes for the study group.

Radiation Exposure — Study Group vs Control Group

October 2012 – December 2016



Average radiation dose in the control group was 176 mGy vs 4.8 mGy for the study group.

References

1. Lindsay BD, Eichling JO, Ambos HD, Cain ME. Radiation exposure to patients and medical personnel during radiofrequency catheter ablation for supraventricular tachycardia. *Am J Cardiol.* 1992 Jul;70(2):218-223.
2. McFadden SL, Mooney RB, Shepherd PH. X-ray dose and associated risks from radiofrequency catheter ablation procedures. *Br J Radiol.* 2002 Mar;75(891):253-265.
3. Calabrese EJ. Origin of the linearity no threshold (LNT) dose-response concept. *Arch Toxicol.* 2013 Sep;87(9):1621-1633.

Transplantation and Assist Devices

Advanced Heart Failure Therapies and Heart Transplant

The Center for Pediatric and Congenital Heart Disease continues to be a leader in the treatment of advanced heart failure and heart transplantation for children and adult patients with congenital heart disease. This program has performed more than 100 pediatric heart transplants since its inception 31 years ago, and it is one of the most recognized pediatric and congenital heart disease transplant programs in Ohio. The volume and complexity of patients receiving heart transplants continue to grow, and over the past 3 years the center has seen a substantial increase in the use of different ventricular assist devices, which are often a bridge to heart transplantation.

Children (< 18 years) Receiving a Ventricular Assist Device (N = 16)

2014 – 2016

Year	Children (N)	Transplant (N)	Recovery (N)	Death (N)
2014	6	4	1	1
2015	5	3	0	2
2016	5 ^a	4	0	0

^aOne child is still in hospital.

Wait-List Outcomes

2014 – 2016

Listing Outcomes	Cleveland Clinic Children's		PHTS	
	Number	%	Number	%
Died pretransplant	6	5.2	1037	14.5
Removed from list	4	3.4	493	6.9
Transplanted	102	87.9	5160	72.2
Waiting on list	4	3.4	460	6.4
Total patients	116	100.0	7150	100.0

PHTS = Pediatric Heart Transplant Study

Source: Pediatric Heart Transplant Study 1993 – 2015. uab.edu/medicine/phts/

Congenital Heart Disease

Congenital heart disease affects an estimated 1 million people in America. Each year, approximately 1 in every 120 babies born in the US has a congenital heart defect. In some cases, the disease is life-threatening at birth. However, many people with a congenital heart condition do not know about it for years. Experts at Cleveland Clinic have extensive experience in the diagnosis and treatment of patients with all forms of congenital heart disease. The services of the Center for Pediatric and Adult Congenital Heart Disease are further enhanced by the Special Delivery Unit. The unit provides in utero diagnosis of complex heart conditions and immediate treatment after birth. Patients with more complex congenital heart disease who have surgery often require additional treatment or procedures throughout their lifetime and, therefore, need follow-up care from a team of experts in congenital heart disease. Cleveland Clinic Children's and Akron Children's Hospital have been collaborating since 2014 to provide the best care possible to patients with congenital heart disease.

Percutaneous Closure Procedures for Adult Congenital Heart Disease

Volume and Outcomes (N = 32)

2016

A total of 32 patients had percutaneous closure procedures at Cleveland Clinic in 2016. The success rate was 100%, and the mortality rate was 0% for both atrial septal defect and patent foramen ovale closures.

	N	Success	Mortality
Percutaneous ASD and PFO closures	32	100%	0%

ASD = atrial septal defect, PFO = patent foramen ovale

3-D Technology Advances Treatment for Complex Congenital Condition

The use of 3-D printing technology is enabling the advancement of care. One such case involves a 3-D printed model of a 9-year-old patient's heart. The patient was born with heterotaxy syndrome, which is a rare condition that causes compromised heart function and blood oxygen levels. Two prior surgeries did not result in adequate treatment. However, the 3-D model allowed the surgical team to fully develop a plan to divide the complex heart into 4 chambers. The surgery was a success and resulted in improved heart function and normal blood oxygenation.

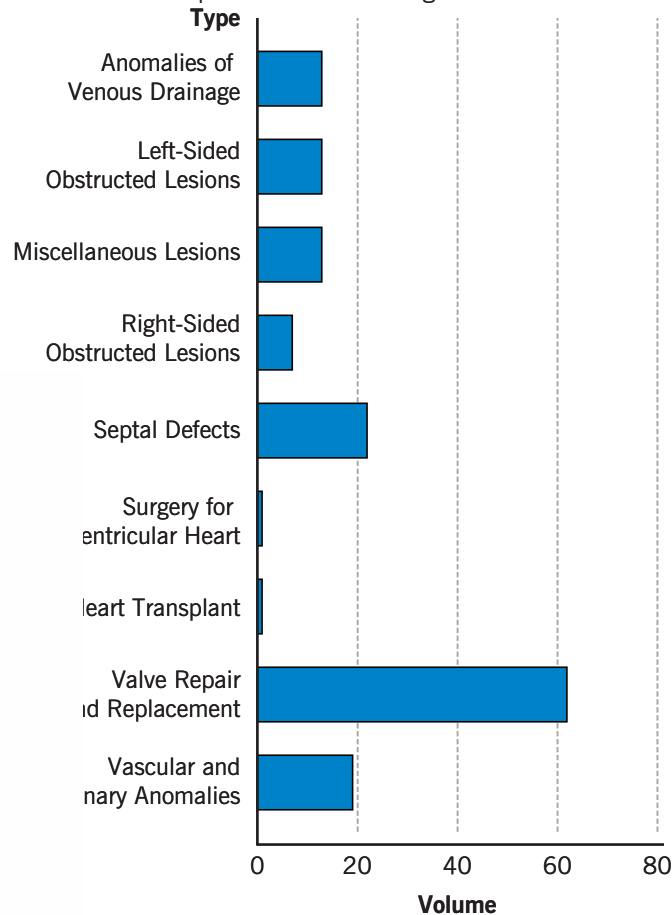


Adult Congenital Heart Surgery

Volume and Type (N = 151)

2016

Cleveland Clinic cardiac surgeons performed 151 open heart surgeries on patients with congenital cardiac disease. With advances in medical care and better long-term survival, the volume of these patients is increasing.

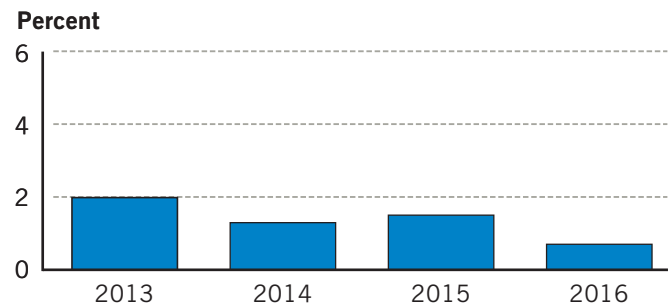


ventricular assist device

In-Hospital Mortality (N = 151)

2013 – 2016

The in-hospital mortality rate for adult congenital heart surgery at Cleveland Clinic in 2016 was 0.7%. Many of these patients have very complex medical backgrounds and conditions and have had multiple surgeries.



Source: Data from the Vizient Clinical Data Base/Resource Manager™ used by permission of Vizient. All rights reserved.

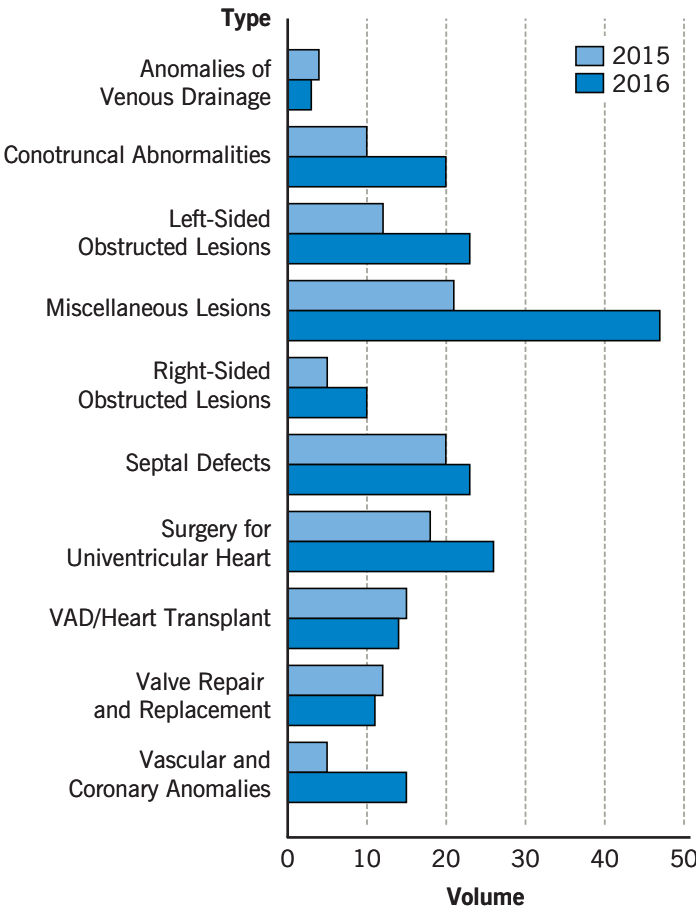
Congenital Heart Disease

Pediatric Congenital Heart Surgery

Volume and Type (N = 192)

2015 – 2016

Cleveland Clinic surgeons performed 192 pediatric congenital heart surgeries in 2016.

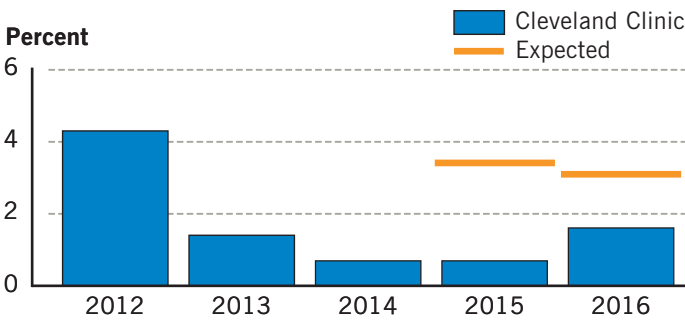


VAD = ventricular assist device

In-Hospital Mortality (N = 192)

2012 – 2016

Cleveland Clinic is committed to achieving the best possible outcomes for patients. The in-hospital mortality rate for pediatric congenital heart surgery patients in 2016 was well below the expected rate of 3.1%.



Source: Society of Thoracic Surgeons (STS) National Database 2016

Pediatric Complex Care

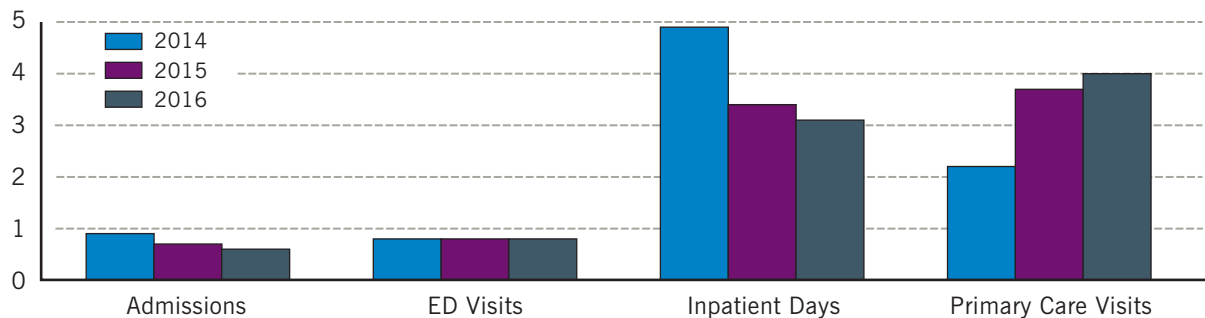
The Pediatric Complex Care Clinic opened in May 2015 to provide a patient-centered medical home on Cleveland Clinic's main campus for children with medical complexity requiring care coordination. Eligible patients have multiple chronic and severe conditions, major functional limitations often requiring medical technology, high healthcare utilization, and substantial family-identified service needs. Goals include optimizing patient experience while reducing hospitalizations, length of stay, and emergency department (ED) visits, and increasing ambulatory visits.

Outcomes demonstrate a positive impact on healthcare utilization for 120 patients. From 2014 to 2016, annual admissions (0.9 to 0.6, $P = 0.014$) and inpatient days (4.9 to 3.1, $P < 0.001$) per patient year decreased significantly. ED visits remained unchanged. Annual primary care visits increased (2.2 to 4, $P < 0.001$).

Pediatric Complex Care Metrics (N = 120)

2014 – 2016

Numbers per Patient



ED = Emergency Department

Multidisciplinary teamwork, enhanced outpatient access, frequent care coordinator outreach, standardized electronic health records, and communication processes throughout transitions of care influence the success of the clinic. Family engagement and feedback also play a critical role in continuously improving quality of care.

Pediatric Intensive Care Unit Quality Outcomes

2012 – 2016

Quality Measures	2012	2013	2014	2015	2016
SMR based on PRISM III ^a					
Cleveland Clinic	0.89	1.18	0.66	0.97	1.29
Reference group ^b	0.94	0.95	0.95	1.00	1.05
SMR based on PIM 2 ^a					
Cleveland Clinic	0.43	0.71	0.36	0.67	0.99
Reference group	0.81	0.81	0.82	0.92	0.98
Unplanned readmissions within 24 hours (%)					
Cleveland Clinic	0.74	1.48	0.73	1.40	0.85
Reference group ^b	0.76	0.82	0.92	0.88	0.88
Standardized length of stay ratio based on PRISM III ^a					
Cleveland Clinic	1.43	0.93	1.10	0.96	0.91
Reference group ^b	1.12	1.08	1.10	1.00	1.01

PIM = Pediatric Index of Mortality, PRISM = Pediatric Risk of Mortality, SMR = standardized mortality ratio

^aStandardized mortality ratio (SMR) is the ratio of actual deaths to predicted deaths. The number of predicted deaths is calculated using the Pediatric Risk of Mortality III (PRISM III) score or the Pediatric Index of Mortality 2 (PIM 2) score — physiology-based mortality risk tools widely used to predict the intensive care outcomes of children. An SMR of 1 indicates that observed mortality is equal to predicted mortality. An SMR > 1 suggests that more patients died than predicted using PRISM III or PIM 2, whereas an SMR < 1 indicates that fewer patients than predicted died. PIM 2 uses physiologic data from the first hour of admission to the pediatric intensive care unit (PICU), though data from the immediate pre-ICU time frame may be used if the intensivist treated the patient before arrival in the PICU. The use of mechanical ventilation, whether the admission was elective, whether the patient was in the PICU primarily for postoperative recovery, the use of cardiac bypass, and the presence of certain high- and low-risk diagnoses are some other variables used to calculate the PIM 2. PRISM III uses data from the first 12 hours of admission to the PICU to predict risk of mortality, using the most extreme values documented in the data collection time frame. Compared with PRISM III, PIM 2 is less likely to be biased by the quality of treatment after admission to the PICU but may be subject to bias from different intervention thresholds. Utilizing PRISM III as an indicator of severity of illness, standardized length-of-stay ratios are calculated by comparing the observed with the expected length of stay.

^bData obtained from Virtual PICU Systems (VPS), LLC. myvps.org.

PICU Hospital-Acquired Infection Rates

2012 – 2016

	2012	2013	2014	2015	2016
Central line-associated bloodstream infections Rate per 1000 central line days (no.)	1.5	0.92	0.82	0.43 (1)	3.9 (11)
Catheter-associated urinary tract infections Rate per 1000 Foley days (no.)	1	0.9	1.88	0.9 (1)	1.8 (2)
Ventilator-associated pneumonia Rate per 1000 ventilator days (no.)	0	0.61	0	0	0.6 (1)
<i>C. difficile</i> infections Rate per 10,000 patient days (no.)	0.7	0.49	0	6.1 (3)	1.93 (1)
Respiratory viral infections (per year)	0	0	2	0	2

Trends in Pediatric Patch Testing: A 10-Year Retrospective Review

Allergic contact dermatitis (ACD) has broad differential diagnoses, and patch testing is the gold standard for diagnosing ACD and identifying relevant allergens. However, it is often underused or delayed, with children receiving systemic immunosuppressants instead.

The institute performed a 10-year retrospective chart review of the 157 patients ages 3 to 18 years who underwent patch testing at Cleveland Clinic from 2005 to 2015. Most (N = 112) were referred by dermatologists for suspected ACD. Forty-four patients were referred by a dermatology nurse practitioner, primary care provider, or dermatology physician assistant. One patient did not have a referral role indicated in their chart.

Patch Testing Referrals (N = 156)

2005 – 2015

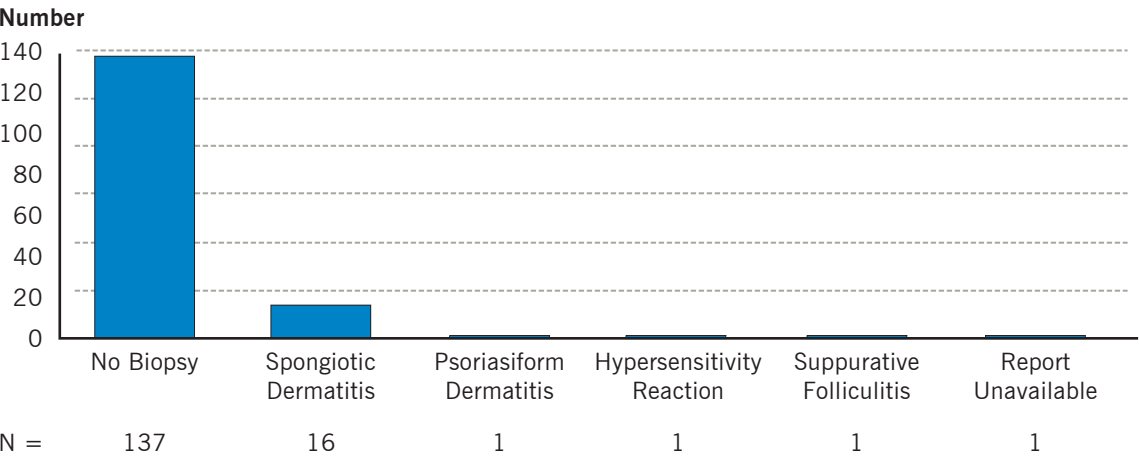
	Total	Referred by Dermatologist (N = 112)		Referred by Others (N = 44)	
		N	Percent	N	Percent
Referral Reason					
Suspected ACD	107	81	72.3	26	59.1
Recalcitrant dermatitis	34	30	26.8	4	9.1
Other	15	1	0.89	14	31.8

ACD = allergic contact dermatitis

Patch testing was performed according to North American Contact Dermatitis Group (NACDG) protocol. Twenty patients had biopsy prior to their patch testing appointments.

Biopsy Results Before Patch Testing (N = 157)

2005 – 2015



Top Cleveland Clinic Cohort Allergens vs the Pediatric NACDG Rate (N = 157)

2005 – 2015

Allergen	Positive Patch Test	N (%)	Positive Rate	P Value ^a
Any positive test	No	38 (25.17)	62.3%	0.002
	Yes	113 (74.83)		
Nickel sulfate, 2.5%	No	114 (75.50)	28.1%	0.37
	Yes	37 (24.50)		
Cobalt chloride, 1%	No	119 (78.81)	12.3%	0.003
	Yes	32 (21.19)		
Fragrance mix 1, 8%	No	129 (85.43)	5.2%	< 0.001
	Yes	22 (14.57)		
Neomycin, 20%	No	131 (86.75)	7.1%	0.011
	Yes	20 (13.25)		
Bacitracin, 20%	No	137 (90.73)	5.2%	0.053
	Yes	14 (9.27)		
Fragrance mix 2, 14%	No	139 (92.05)	2.1%	< 0.001
	Yes	12 (7.95)		
<i>Myroxylon pereirae</i> , 25%	No	140 (92.72)	5.7%	0.49
	Yes	11 (7.28)		
Cocamidopropyl betaine, 1%	No	141 (93.38)	1.4%	< 0.001
	Yes	10 (6.62)		
Chromium	No	143 (94.70)	2.3%	0.048
	Yes	8 (5.30)		

NACDG = North American Contact Dermatitis Group

^aDerived from binomial tests

A mean of 59.2 (SD = 24.6) allergens per patient were tested, with 115 (73.25%) patients experiencing at least 1 positive reaction and 86 (54.78%) having 2 or more positive reactions. The most prevalent allergens in this population were nickel and cobalt.

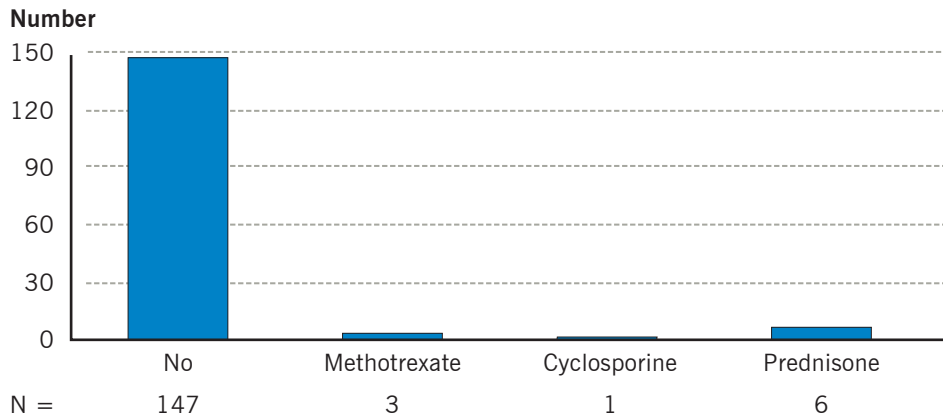
Compared with NACDG allergen rates reported from 2005 to 2012,¹ the overall rate of positive patch tests was higher at Cleveland Clinic ($P = 0.002$); rates of positive cobalt, fragrance mix 1 and 2, neomycin, cocamidopropyl betaine, and chromium tests were also significantly higher.

No significant association was found between age and allergen sensitivity. Males were more likely to have a positive reaction to fragrance mix 1 than females ($P = 0.02$). Those with a history of atopy were more likely to have a positive reaction to cobalt ($P = 0.008$) and chromium ($P = 0.03$).

Of the 60 patients (38.2%) returning for follow-up, 37 (60.7%) reported improvement; most (N = 54 [88.5%]) were being treated with topical corticosteroids. Ten patients were receiving immunosuppressant therapy.

Systemic Immunosuppressive Therapy at Follow-Up (N = 157)

2005 – 2015



These results provide information regarding common allergens in children that can enhance patient care, and show that earlier patch testing can improve quality of life and avoid systemic immunosuppressant use.

Reference

1. Zug KA, Pham AK, Belsito DV, DeKoven JG, DeLeo VA, Fowler JF Jr, Fransway AF, Maibach HI, Marks JG Jr, Mathias CG, Pratt MD, Sasseville D, Storrs FJ, Taylor JS, Warshaw EM, Zirwas MJ. Patch testing in children from 2005 to 2012: results from the North American contact dermatitis group. *Dermatitis*. 2014 Nov-Dec;25(6):345-355.

The Section of Pediatric Endocrinology at Cleveland Clinic Children's is actively engaged in both quality and process improvement initiatives. In 2016, the section focused on two projects: reducing diabetic ketoacidosis (DKA) hospital admissions and improving follow-up of congenital hypothyroidism.

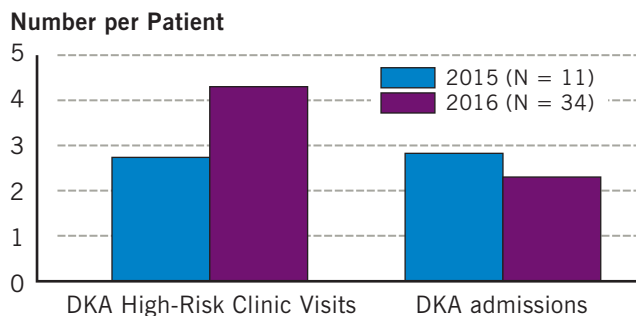
Reducing DKA Admissions by Targeting High-Risk Diabetics

Children with poorly controlled type 1 diabetes are at the highest risk for developing DKA. Pediatric endocrinologists at Cleveland Clinic Children's, together with psychologists, dietitians, and social workers staff an intensive multidisciplinary clinic to help patients with high HbA_{1c}. The providers each spend 45 minutes with every patient, followed by a team discussion of individual problems. The additional care complements medical and dietary recommendations. The DKA high-risk HbA_{1c} clinic has grown from an initial group of 11 patients in 2015 to 34 children and adolescents in 2016.

This coordinated, multidisciplinary approach has lowered the HbA_{1c} for 35% of patients. The clinic also reports an 18% decrease in the rate of DKA hospital admissions per patient with more frequent follow-up in the DKA high-risk HbA_{1c} clinic.

Decrease in Patients Hospital Admissions After DKA High-Risk Clinic Visits

2015 – 2016



DKA = diabetic ketoacidosis

Congenital Hypothyroidism Follow-Up

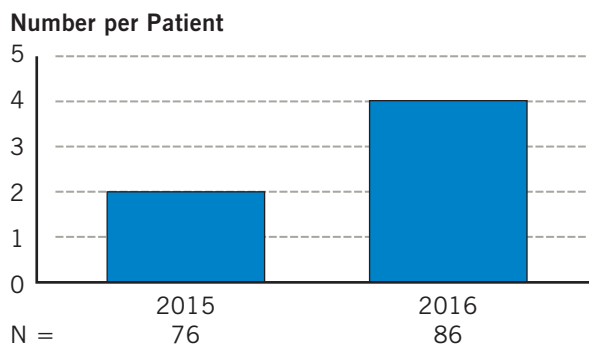
Congenital hypothyroidism affects 1 in 4000 live births. Infants with congenital hypothyroidism are at high risk of developmental delay. Guidelines from the American Academy of Pediatrics recommend frequent testing of thyroid function and frequent clinic visits to monitor and adjust thyroid medication in the first 3 years of life to prevent mental retardation.

The section of pediatric endocrinology developed a self-populating list in the Epic electronic medical record as a quality improvement project to track outpatient clinic visits to Pediatric Endocrinology. The goal was to ensure that every child younger than 3 years with a diagnosis of congenital hypothyroidism has adequate follow-up. Tracking provides the opportunity to recognize noncompliance quickly; a staff member then calls the family to stress the importance of follow-up appointments.

This ongoing project resulted in an increased number of patients seen in 2016 (N = 86) over 2015 (N = 76), as well as an increase in the frequency of outpatient visits to Pediatric Endocrinology (2.4 visits per patient in 2015 and 3.8 visits per patient in 2016).

Congenital Hypothyroidism Visits

2015 – 2016



Pediatric Endoscopic Procedures

To assess pediatric endoscopy quality, the Department of Pediatric Gastroenterology reviewed the records of all patients undergoing endoscopic procedures in 2016 performed in the endoscopy suite, in the operating room, and at bedside. These procedures were then compared with those done in 2015. Most procedures were done under general anesthesia, which was administered by a pediatric anesthesiologist. The department evaluated:

- The rate of patient-reported symptoms, such as nausea, abdominal pain, fever, cough, chest pain, or sore throat that occurred within 7 days after the procedure
- The rate of unplanned emergency department (ED) referral or hospital admission following the procedure
- The occurrence of serious complications such as excess bleeding, perforation, or death

Pediatric Endoscopic Procedures (N = 2545)

2015 – 2016

	2015		2016	
	N	%	N	%
Total procedures: endoscopy, colonoscopy, and therapeutic	1248		1297	
Patients undergoing endoscopic procedures	835		868	
Self-reported symptoms ≤ 7 days postprocedure	24	2.9	30	3.4
Reported symptoms postprocedure resulting in ED evaluation	3	0.2	13	1.5
Unanticipated admission ≤ 7 days postprocedure	1	0.4	2	0.2
Complications ≤ 7 days postprocedure	2	0.2	0	0

ED = emergency department

Children and adolescents undergoing pediatric endoscopic procedures did well, with only a few calling to report postprocedural symptoms and an even smaller number requiring ED evaluation or admission. In 2016 no endoscopic procedures resulted in serious complications. The rate of complications fits within published complication rate ranges of 0.63%–2.3% for pediatric endoscopic procedures.¹⁻³

References

1. Thakkar K, El-Serag HB, Mattek N, Gilger MA. Complications of pediatric EGD: a 4-year experience in PEDS-CORI. *Gastrointest Endosc.* 2007 Feb;65(2):213-221.
2. Thakkar K, Holub JL, Gilger MA, Shub MD, McOmber M, Tsou M, Fishman DS. Quality indicators for pediatric colonoscopy: results from a multicenter consortium. *Gastrointest Endosc.* 2016 Mar;83(3):533-541.
3. Thakkar K, El-Serag HB, Mattek N, Gilger M. Complications of pediatric colonoscopy: a five-year multicenter experience. *Clin Gastroenterol Hepatol.* 2008 May;6(5):515-520.

Pediatric Colonoscopy

The Department of Pediatric Gastroenterology annually reviews all pediatric colonoscopic procedures to confirm the documentation of the specific indications for colonoscopy and to determine the cecal intubation rate and the rate of completion of the examination to the terminal ileum.

Procedures performed in patients with a history of prior colon or ileal resections and colonoscopies that were planned as limited procedures were excluded. Cecal and ileal intubation rates were compared with reported outcomes in pediatric patients at other institutions. The department evaluated patient or procedural-related factors that limited rate of completion of the examination to the terminal ileum (TI). Time to complete the procedure (“scope in/scope out”) as a potential surrogate quality indicator was also determined.

Pediatric Colonoscopy (N = 750)

2015 – 2016

	2015		2016	
	N	%	N	%
Colonoscopies	391		359	
Colonoscopy complete to the terminal ileum	356	91	334	93
Colonoscopy with cecal intubation	382	98	348	97
Unsuccessful TI intubation in patients with IBD	7	1.8	12	3.3
Incomplete colonoscopy due to inadequate bowel prep	5	1.3	2	0.6
Average colonoscopy procedure “scope in/scope out” time (min)	40		38	
Average procedure time for complete colonoscopy to the TI (min)	39		37	
Average procedure time for colonoscopy without TI intubation (min)	48		52	

IBD = inflammatory bowel disease, TI = terminal ileum

The cecal intubation rate and the rate of completion of the examination to the TI were 97% and 93%, respectively. In 12 patients diagnosed with inflammatory bowel disease, colonoscopy was limited because of the presence of marked intestinal inflammation or a finding of colonic or ileal strictures. In only 0.6% of patients, colonoscopy completion rates were limited by poor bowel prep. The cecal and TI intubation rates exceed those rates reported in other large multicenter series of children undergoing colonoscopy¹ (85% for cecal intubation and 69.4% for TI intubation). The time to perform the procedure was increased in colonoscopies where the TI could not be reached (*P* = 0.025), likely reflecting increased time attempting to intubate the ileocecal valve.

Reference

1. Thakkar K, Holub JL, Gilger MA, Shub MD, McOmber M, Tsou M, Fishman DS. Quality indicators for pediatric colonoscopy: results from a multicenter consortium. *Gastrointest Endosc*. 2016 Mar;83(3):533-541.

82%

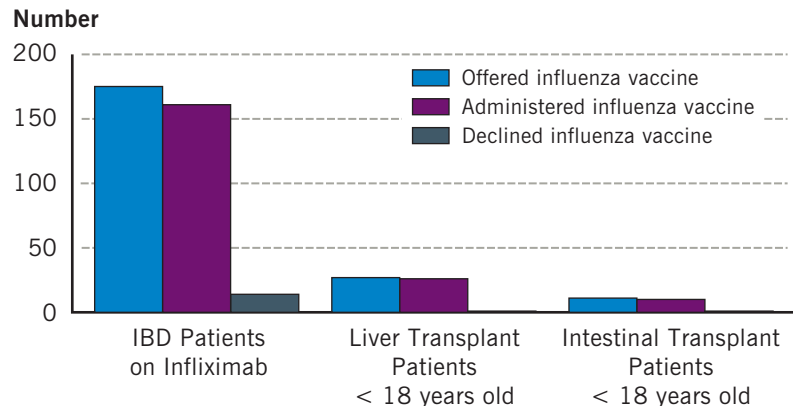
Nonalcoholic fatty liver disease (NAFLD) is considered the hepatic manifestation of the obesity epidemic and has become the most common form of chronic liver disease in children and adolescents. The Metabolic Liver Disease Clinic has incorporated a new ultrasound-based imaging test called vibration-controlled transient elastography (FibroScan®) that can noninvasively diagnose the stage of liver fibrosis by measuring liver stiffness, thereby avoiding liver biopsies in these children. This test has been performed on 51 children with NAFLD to assess the severity of liver disease. By using this noninvasive real-time imaging test, an invasive liver biopsy was avoided in 42 (82%) of the patients.

Infection Prevention

Published pediatric treatment guidelines recommend that all children > 6 months of age receive an annual influenza vaccination.¹ Children and adolescents with inflammatory bowel disease (IBD) on either immunomodulators or biologic therapies and children being treated with combination immunosuppressive medication regimens following liver and intestinal transplantation can be immune compromised, which increases their risk for significant infection. The department's goal is to discuss the importance of annual influenza vaccination with all patients and their families, as well as to offer annual vaccination. Vaccine administration compliance in patients with IBD receiving regular infliximab infusions, and in patients following liver and intestinal transplant, were documented.

Influenza Immunization Compliance in Pediatric Patients

2016



IBD = inflammatory bowel disease

In 2016 the department reviewed the importance of annual influenza vaccine with 100% of patients. The overall influenza immunization compliance rate in these at-risk patients was 92.5%. The department's immunization rate is above the National Immunization Survey-Flu vaccination rate (2015–2016) of 59.3% for patients aged 6 months to 17 years.

¹National Influenza Survey-Flu (NIS-FLU) and Behavioral Risk Factor Surveillance System (BRFSS), 2015–2016. [cdc.gov](https://www.cdc.gov)

Pediatric Liver Transplantation

Cleveland Clinic's pediatric liver transplant program is one of the most experienced in the nation, dating back to 1985. The program is managed by a pediatric liver transplant medical director with a team of two additional pediatric hepatologists. The program offers a full range of pediatric liver transplant options, including partial grafts from living donors, whole-organ and split-liver transplants from deceased donors, and liver transplant in the context of multivisceral transplantation. Pediatric liver transplant outcomes are reported to the Scientific Registry of Transplant Recipients (SRTR).¹ These data are generated over a 2-year period; thus, the data presented below represent information available at the time of reporting.

Pediatric (< 18 years) 1-year Patient Survival, Single Organ Transplants

July 1, 2014 – Dec. 31, 2015 Retransplants excluded

	Cleveland Clinic Children's	US
Number of transplants evaluated	11	1137
Estimated probability of surviving at 1 year (unadjusted for patient and donor characteristics)	100%	95.52%
Expected probability of surviving at 1 year (adjusted for patient and donor characteristics)	96.18%	—
Number of observed deaths during the first year after transplant	0	49
Number of expected deaths during the first year after transplant	0.41	49
Estimated hazard ratio ^a	0.83	1.00
95% confidence interval for hazard ratio ^b	(0.10-2.32)	—

^aThe hazard ratio provides an estimate of how Cleveland Clinic's results compare with what was expected based on modeling the transplant outcomes from all US programs. A ratio above 1 indicates higher than expected patient death rates (eg, a hazard ratio of 1.5 would indicate 50% higher risk), and a ratio below 1 indicates lower than expected patient death rates (eg, a hazard ratio of 0.75 would indicate 25% lower risk). If Cleveland Clinic's patient death rate were precisely the expected rate, the estimated hazard ratio would be 1.0.

^bThe 95% confidence interval (0.10-2.32) indicates the location of Cleveland Clinic's true hazard ratio with 95% probability. The best estimate is 17% lower risk of patient death compared with an average program, but Cleveland Clinic's performance could plausibly range from 90% reduced risk to 132% risk.

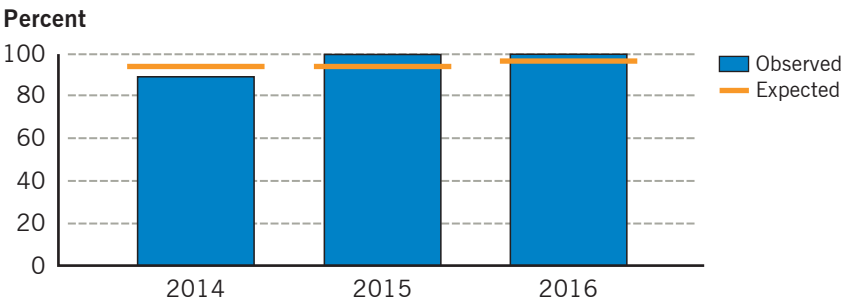
srtr.org

Cleveland Clinic’s pediatric liver transplant team offers a full range of pediatric liver transplant procedures, including partial grafts from living donors, whole-organ and split-liver transplants from deceased donors, and liver transplant as part of multivisceral transplantation.

Pediatric Liver Transplantation

One-Year Pediatric Patient Survival

2014 – 2016



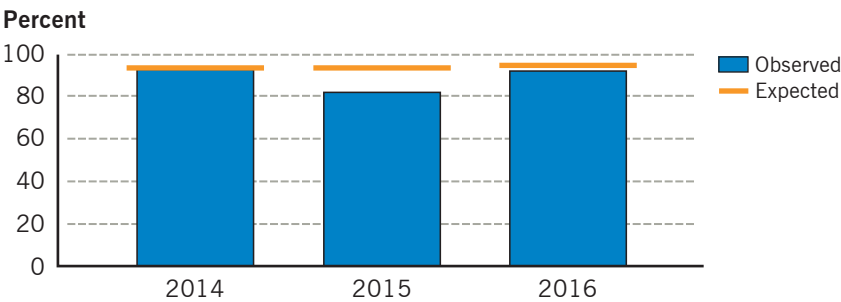
N = 9 9 11

Source: Scientific Registry of Transplant Recipients (SRTR) srtr.org

Each reporting year reflects transplants performed over a 2.5-year period.

Three-Year Pediatric Patient Survival

2014 – 2016



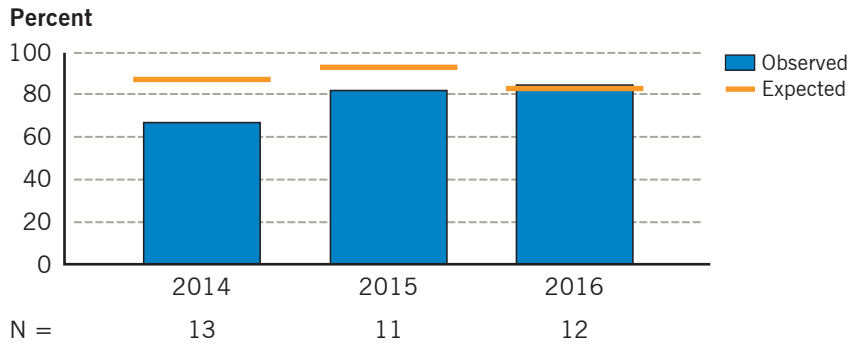
N = 13 11 12

Source: Scientific Registry of Transplant Recipients (SRTR) srtr.org

Each reporting year reflects transplants performed over a 2.5-year period.

One-Year Pediatric Graft Survival

2014 – 2016

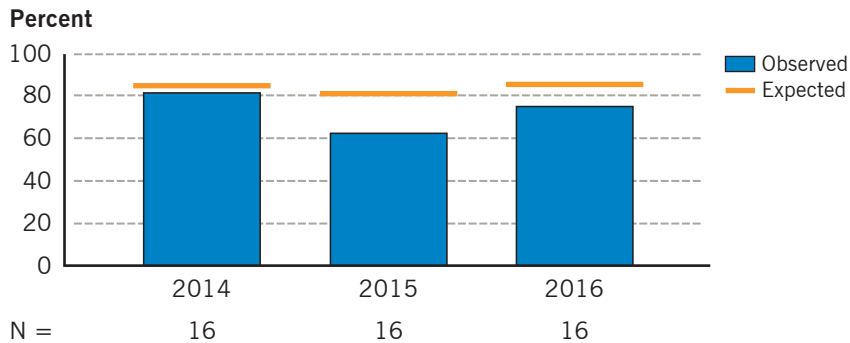


Source: Scientific Registry of Transplant Recipients (SRTR) srtr.org

Each reporting year reflects transplants performed over a 2.5-year period.

Three-Year Pediatric Graft Survival

2014 – 2016



Source: Scientific Registry of Transplant Recipients (SRTR) srtr.org

Each reporting year reflects transplants performed over a 2.5-year period.

Pediatric Healthy Living Programs

Cleveland Clinic Children's continues to expand programming aimed at helping children with high body mass index (BMI) achieve optimal health. The multidisciplinary Be Well Clinic served nearly 400 children in 2016, a greater than 10% increase from 2015. Together, a comprehensive team including pediatricians, pediatric gastroenterologists, psychologists, and registered dietitians worked individually with patients and their families to develop strategies for healthy lifestyle change. At three regional locations, multidisciplinary teams including medical

and mental health professionals, pediatric registered dietitians, and exercise physiologists led 50 children and their families through a 12-week curriculum focused on making the home a place where it is easy to make healthy choices. The Healthy Living shared medical appointment began its second year of bringing medical care and health education together in a supportive and child-friendly environment. In this model, patients and their families learn healthy lifestyle behaviors not only from the expert medical team, but also from each other.

Mean Change in Percentage of Children at 95th BMI Percentile^a

2013 – 2016

	2013 (N)	2014 (N)	2015 (N)	2016 (N)
Be Well	-2.3 (68)	-2.9 (125)	-2.6 (122)	-2.1 (107)
Fit Youth	-3.1 (34)	-4.5 (15)	-3.3 (18)	-2.8 (13)

^aFlegal KM, Wei R, Ogden CL, Freedman DS, Johnson CL, Curtain LR. Characterizing extreme values of body mass index-for-age by using the 2000 Centers for Disease Control and Prevention growth charts. *Am J Clin Nutr.* 2000 Nov;90(5):1314-1320.

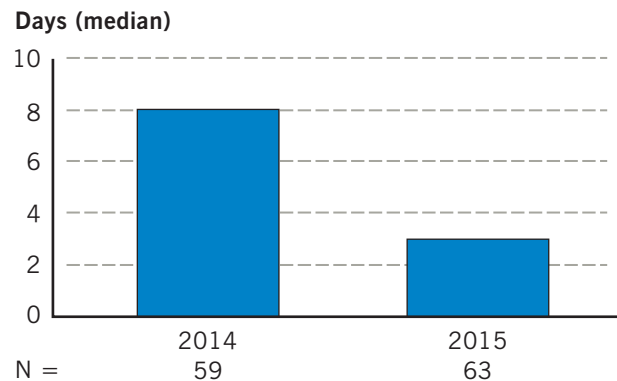
For the past 4 years, the Be Well and Fit Youth programs have shown a statistically significant reduction ($P < 0.05$) in the percent of the 95th BMI percentile, with decreases ranging from 2.1% to 4.5%.

Pediatric Hematology and Oncology

After infancy, cancer is the leading cause of death by disease among US children. In 2015, an estimated 10,380 new cases of cancer were expected to be diagnosed in children aged 0–14. The major types of cancer in children in that age range are acute lymphocytic leukemia, brain and other central nervous system tumors, and neuroblastomas, which were expected to account for more than half of new cases in 2015.¹ The goal of Cleveland Clinic Children's hematology and oncology program is to treat patients within 5 days from the date of diagnosis, when the initial diagnosis is made at Cleveland Clinic Children's.

Time to Treatment

2014 – 2015



All patients aged 0–20 diagnosed or treated for all cancer types at Cleveland Clinic main campus and family health centers are included. Initial treatment includes any cancer-related treatment (surgery, chemotherapy, radiation).

Reference

1. cancer.gov/research/progress/snapshots/pediatric

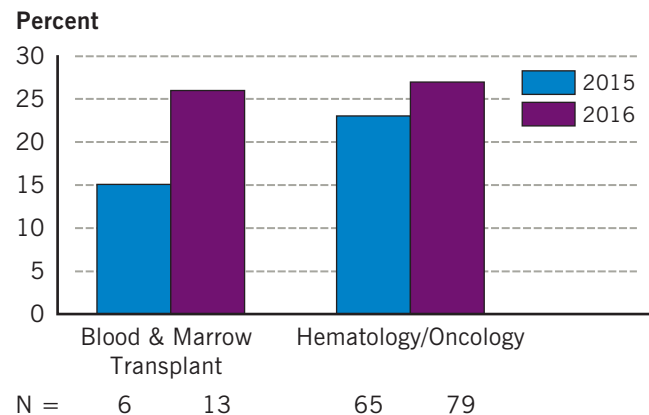
Reduction in Readmissions

Thirty-day readmission reduction is challenging because of patient population complexities and adverse effects of treatment. In 2015, there were 65 readmissions out of 282 discharges for hematology and oncology patients and 6 readmissions out of 40 discharges after blood and marrow transplants (BMTs). In 2016, 79 patients were readmitted out of 298 discharges from hematology and oncology, and 13 patients were readmitted out of 50 discharges after BMT. The focus for 2017 will follow a 4-step strategy to reduce readmission rates:

- Core 4 bundle
- Monday signout meeting review
- Adopting the University of Kentucky CLIMARS bundle (includes consideration of the following 7 items: clinic follow-up, labs, imaging, and medications, including authorization for medications, reconciliation of medications, and prescription management)
- Introduction of a hematology and oncology rounding registered nurse to assist with discharge planning and inpatient/outpatient coordination

Thirty-Day Readmission Rate

2015 – 2016



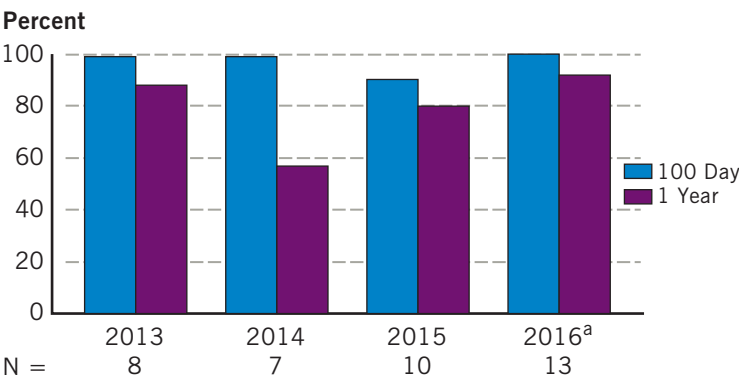
BMT = blood and marrow transplant

BMT Survival

Working closely with the Taussig Cancer Institute and the Adult Blood and Marrow Transplant (BMT) program, Cleveland Clinic Children’s Pediatric BMT Program provides lifesaving procedures that offer hope for curing a variety of malignant and nonmalignant diseases, immunologic diseases, and metabolic disorders that were once thought to be incurable. The pediatric program has earned accreditation from the Foundation for the Accreditation of Cellular Therapy, which establishes standards for high-quality medical and laboratory practice in cellular therapies. Despite the high-risk patient population, the program provides outstanding care with a consistently low transplant-related mortality rate and high overall survival.

Blood and Marrow Transplant Survival

2013 – 2016



^aNot all patients are 1 year out from transplant.

Preliminary data^a obtained from the Coordinating Center of the Center for International Blood and Marrow Transplant Research (CIBMTR) is presented below. The analysis had not been reviewed or approved by the statistical or scientific committee of the CIBMTR at the time this publication went to press; however, the data offer a reference against which to compare Cleveland Clinic Children’s results.

CIBMTR	Malignant (N = 1029)		Nonmalignant (N = 1076)	
Outcomes	Evaluated	Probability (95% CI)	Evaluated	Probability (95% CI)
Overall survival	1029		1076	
100 days		94 (93 – 96)		96 (94 – 97)
1 year		78 (75 – 81)		90 (88 – 91)

CIBMTR = Center for International Blood and Marrow Transplant Research

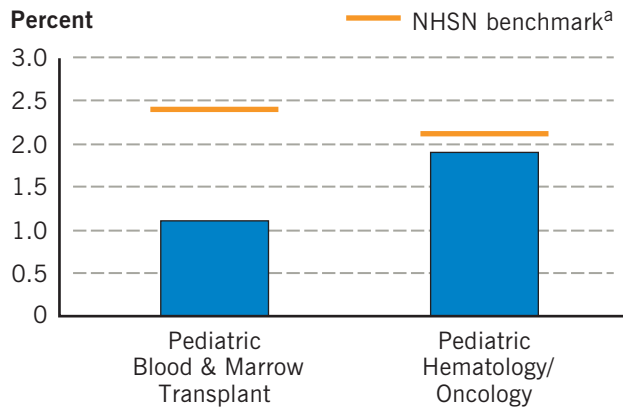
^aThese data were published with the prior approval of the CIBMTR.

Central Line-Associated Bloodstream Infections

To avoid central line-associated bloodstream infections (CLABSI), healthcare providers must follow a strict protocol when inserting the line and stringent infection control practices each time they check the line or change the dressing.¹ The BMT and the hematology and oncology programs' CLABSI rate falls below the national benchmark set forth by the National Healthcare Safety Network (NHSN).²

Central Line-Associated Bloodstream Infections

2016



NHSN = National Healthcare Safety Network

^aNational Healthcare Safety Network 2016–2017 benchmark for central line-associated bloodstream infections (CLABSI) is 2.1/1000 central line days for pediatric Hematology/Oncology ward and 2.4/1000 central line days for pediatric hematopoietic stem cell transplant ward.

References

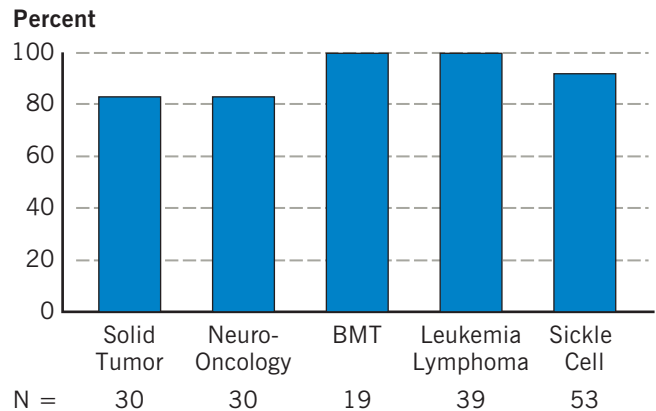
1. cdc.gov/hai/bsi/clabsi-resources.html
2. The National Healthcare Safety Network 2016–2017 benchmark for CLABSI is 2.1/1000 central line days for pediatric Hematology/Oncology ward and 2.4/1000 central line days for pediatric hematopoietic stem cell transplant ward.

All Diseases — Influenza Vaccination Rate

Patients with hematologic or solid cancers undergoing chemotherapy and/or stem cell therapy are at high risk for influenza-related complications. Active surveillance for influenza-like illness conducted on pediatric and adult oncology units during the 2009 influenza pandemic revealed that 20% of patients hospitalized with fevers were infected with influenza.^{1,2} Other studies have suggested that as many as two-thirds of pediatric oncology patients who were diagnosed with influenza during the 2009 pandemic required hospitalization.^{1,3} The department goal is 90% vaccination compliance for all diseases, and the overall percentage is 91%. Targeting those who refuse vaccines will be the focus for 2017.

Influenza Vaccination Rate

2016



BMT = Blood & Marrow Transplant

References

1. Kersun LS, Reilly AF, Coffin SE, Sullivan KE. Protecting Pediatric Oncology Patients From Influenza. *Oncologist*. 2013;18(2):204-211.
2. Tai Y, Lee TC, Chang HL, Chen KT. Epidemiology and outcomes of hospitalization of influenza in the cancer population in Taiwan. *J Cancer Res Clin Oncol*. 2009 Aug;135(8):1061-1066.
3. Caselli D, Carraro F, Castagnola E, Ziino O, Frenos S, Milano GM, Livadiotti S, Cesaro S, Marra N, Zanazzo G, Meazza C, Cellini M, Aricò M. Morbidity of pandemic H1N1 influenza in children with cancer. *Pediatr Blood Cancer*. 2010 Aug;55(2):226-228.

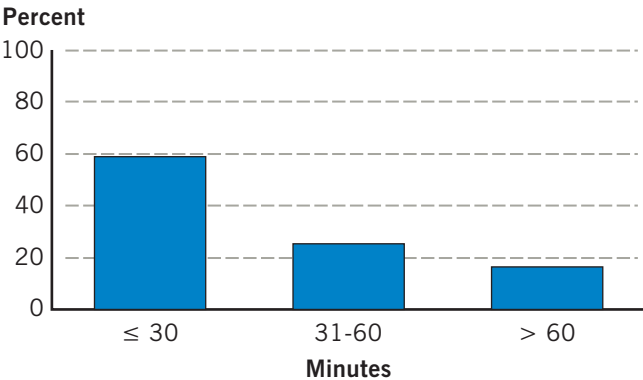
Pediatric Hematology and Oncology

Fever and Neutropenia

Fever and neutropenia are expected complications in children receiving chemotherapy for cancer. Guidelines for their management have been developed specifically for the pediatric population. Outcomes are dependent on timely intervention, especially time to antibiotic (ATB) delivery. A recent study of the pediatric hematology and oncology population in a large university practice during a 15-month period delivered ATBs within 59 minutes of outpatient check-in to all patients with cancer presenting with fever and neutropenia; the reported median time to ATB delivery was 43 minutes.¹ By adopting national guidelines for fever and neutropenia, Cleveland Clinic Children's aims to improve outcomes by administering ATBs within 60 minutes of a patient's arrival on the hospital floor or in an outpatient clinic.

Time to Antibiotic Administration in Outpatients With Fever and Presumed Neutropenia (N = 32)

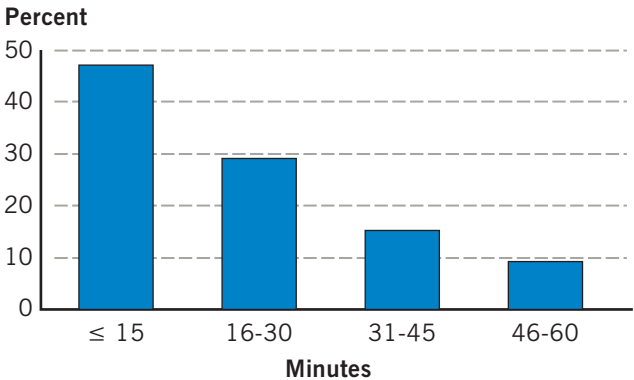
2016



In 2016, a total of 84% of outpatients with fever and presumed neutropenia received antibiotics within 60 minutes of arriving at the outpatient clinic, with an average time to administration of 47 minutes.

Time to Antibiotic Administration in Inpatients With Fever and Neutropenia (N = 55)

2016



All inpatients with fever and neutropenia receive antibiotics within 60 minutes of arriving on the hospital floor, with an average time to administration of 25 minutes.

Reference

1. Salstrom JL, Coughlin RL, Pool K, Bojan M, Mediavilla C, Schwent W, Rannie M, Law D, Finnerty M, Hilden J. Pediatric patients who receive antibiotics for fever and neutropenia in less than 60 min have decreased intensive care needs. *Pediatr Blood Cancer*. 2015 May;62(5):807-815.

Pediatric Hospital Medicine

Asthma

Asthma is the most common serious chronic disease in infants and children. During an asthma flare-up, a child can wheeze, cough, and experience shortness of breath, sometimes severe enough to require hospitalization.

The Joint Commission recommends the Children's Asthma Care (CAC) Core Measures to ensure that the highest quality of care is provided to children admitted to the hospital with an asthma flare-up:

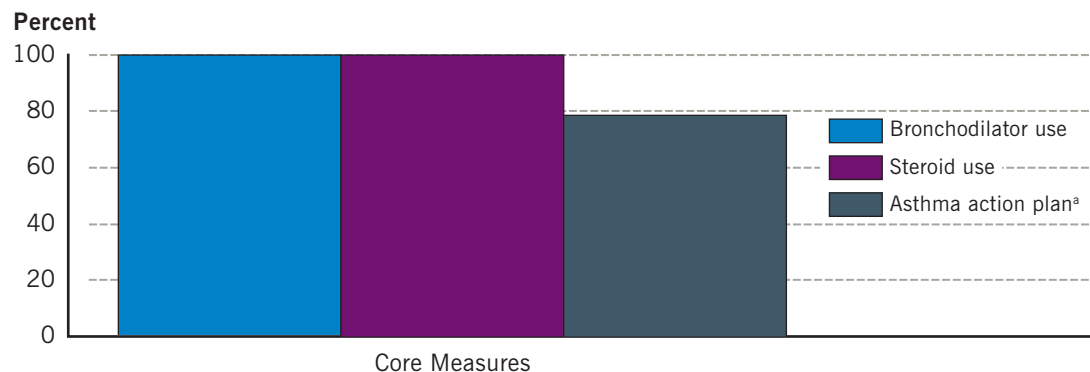
CAC-1: A reliever medication, such as albuterol.

CAC-2: A steroid medication given by mouth or through an IV, such as prednisone.

CAC-3: A patient-specific home management plan upon discharge.

Asthma Core Measure Compliance (N = 237)

2016

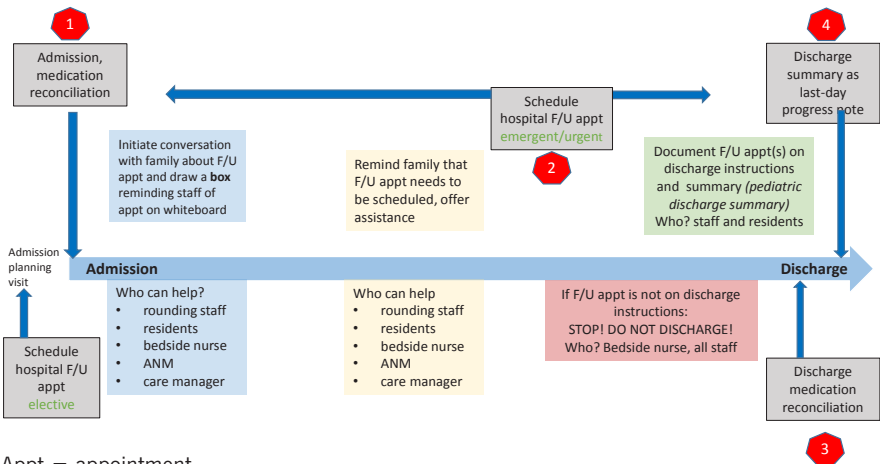


^aA change in data collection methods (change in reviewers, more stringent interpretation) in 2016 may have impacted compliance with the Asthma Action Plan.

Core Four Compliance

The Core 4 Elements for Safe Transitions promote a reliable discharge process, which has been shown to reduce readmissions throughout Cleveland Clinic. Ensuring compliance with admission medication reconciliation, discharge medication reconciliation, scheduling a clinically-appropriate follow-up appointment before discharge, and completing the discharge summary within 48 hours of discharge are associated with decreased readmission rates for patients cared for by the pediatric hospital medicine physicians. In 2016 the department of Pediatric Hospital Medicine focused quality improvement efforts on a family-centered process for making hospital follow-up appointments, resulting in 100% of patients having an appointment by the end of the year. We encourage adherence to the Core 4 process for every patient and look forward to expanding our quality improvement work on these elements.

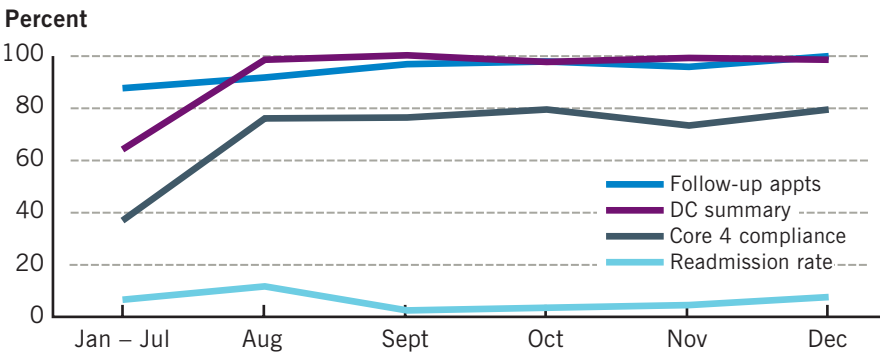
Core 4 Safe Transitions of Care



Appt = appointment
F/U = follow-up
ANM = Assistant Nurse Manager

Core 4 Compliance and Readmission Rate

January 2016 – December 2016

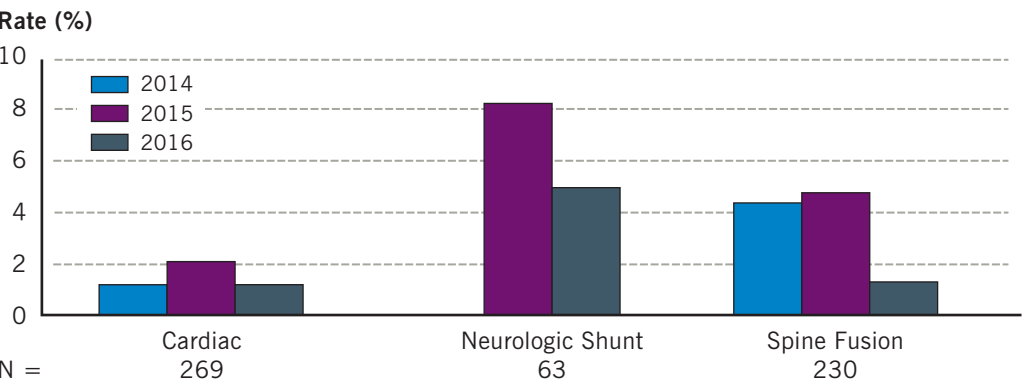


Pediatric Infectious Diseases

Surgical Site 90-Day Infection Rate

Surgical Site Infection Rate for Pediatric Cardiac, Neurologic Shunt, and Spine Fusion Procedures

2014 – 2016



The aggregate infection rate for major cardiac, neurologic shunt, and spine fusion procedures was 2.3% in 2014, 3.9% in 2015, and 1.6% in 2016.

Preoperative Antibiotic Prophylaxis

Preincision Prophylactic Antibiotics Given on Time During Major Pediatric Procedures Performed

2016

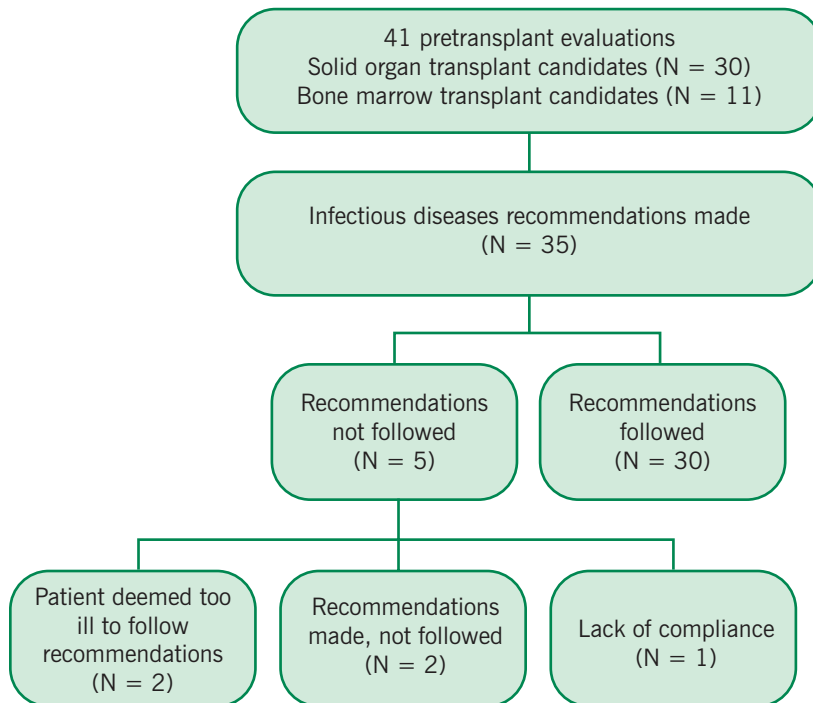
	Antibiotic Given on Time (Cases)	Total Number of Cases	% Given on Time
Cardiac	85	86	99
Neurologic shunt	20	20	100
Spine fusion	77	78	99
Total	182	184	99

At Cleveland Clinic Children’s sites, preoperative antibiotic compliance for major cardiac, neurologic shunt, and spine fusion surgery procedures was 99% in 2016.

Pediatric Infectious Diseases

Pretransplant Evaluation and Consult Service (N = 41)

2016



The pediatric infectious disease consult service performed 41 pretransplant evaluations on solid organ or bone marrow transplant candidates, ensuring that patients receive necessary vaccinations and optimal antimicrobial prophylaxis.

97.1%

The influenza vaccination rate for employees, physicians, and nurses working in Cleveland Clinic Children's was 97.1% for the 2016–2017 season.

Central Line-Associated Bloodstream Infection

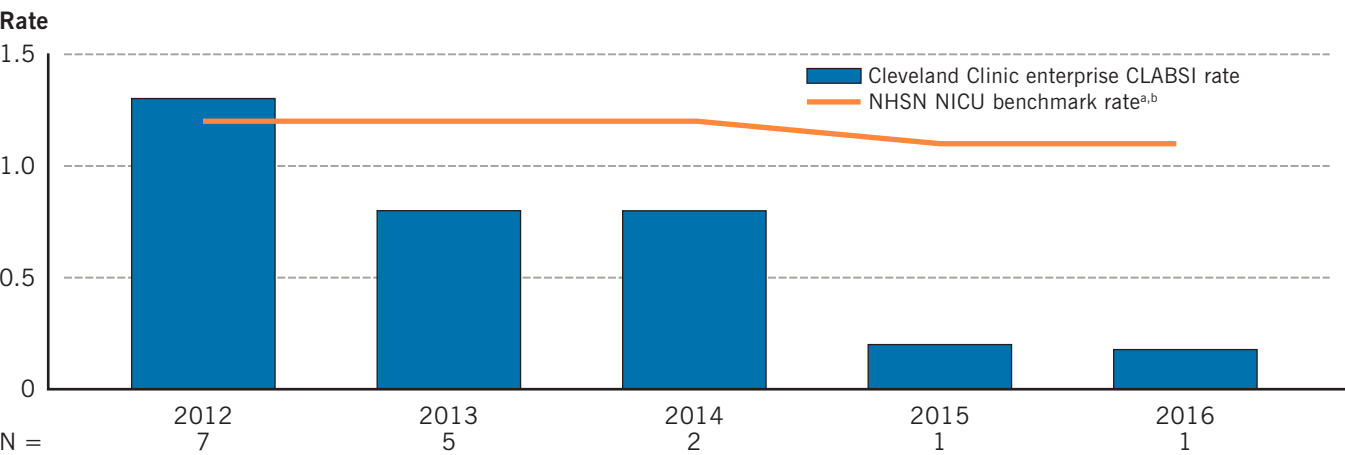
Cleveland Clinic's 3 Neonatal Intensive Care Units (NICUs) continue to make great progress in reducing central line-associated bloodstream infections (CLABSI).

The combined mean CLABSI rate for 2015 was 0.2 per 1000 central-line days. For 2016 the rate decreased further to 0.18 per 1000 central-line days, which is well below the most recent National Health Safety Network (NHSN) benchmark rate of 1.1/1000 central line days.^a

The NHSN CLABSI benchmark rate is calculated by combining birth weight and infection data from level III NICUs at all reporting facilities.

Neonatal Intensive Care Unit Central Line-Associated Bloodstream Infection Rate/1000 Central Line Days

2012 – 2016



CLABSI = central line-associated bloodstream infection, NHSN = National Health Safety Network, NICU = Neonatal Intensive Care Unit

Source for NHSN benchmark is accurate as data are published only every 2 years.

^aBenchmark for 2012–2014: Dudeck MA, Weiner LM, Allen-Bridson K, Malpiedi PJ, Peterson KD, Pollack DA, Sievert DM, Edwards JR. National Healthcare Safety Network (NHSN) report, data summary for 2012, Device-associated module. *Am J Infect Control*. 2013 Dec;41(12):1148-1166.

^bBenchmark for 2015–2016: Dudeck MA, Edwards JR, Allen-Bridson K, Gross C, Malpiedi PJ, Peterson KD, Pollock DA, Weiner LM, Sievert DM. National Healthcare Safety Network report, data summary for 2013, Device-associated Module. *Am J Infect Control*. 2015 Mar 1;43(3):206-221.

Shrunkened Risk-Adjusted Rates for Mortality, Late Bacterial Infection, Necrotizing Enterocolitis, Pneumothorax, and Chronic Lung Disease

The Vermont Oxford Network (VON), with its data repository for neonatal outcomes, provides a standard for 2015 shrunkened risk-adjusted data for mortality, late bacterial infection, necrotizing enterocolitis (NEC), pneumothorax, and chronic lung disease (for those less than 33 weeks' gestation) in all infants (preterm and term) admitted to a neonatal intensive care unit (NICU) in the US and abroad. Below are data for Cleveland Clinic Children's level IV NICU. The blue circles show shrunkened standard mortality or morbidity ratio (SMR) and the black lines show the 95% confidence interval.

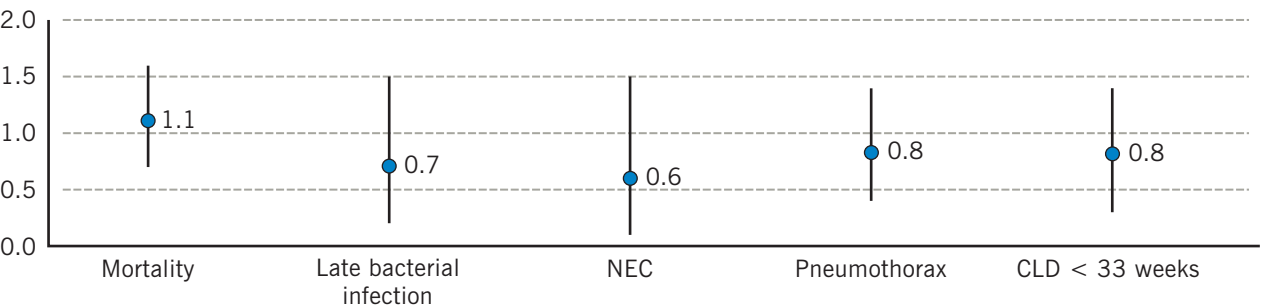
These outcomes can be used to evaluate quickly the quality of a program. Shrunkened risk-adjusted data provide a more consistent way to evaluate the performance of a unit and take into account volume and case mix. A standardized mortality rate and its upper and lower bounds allow for comparison of data with other centers that provide similar levels of care.

The results from Cleveland Clinic Children's NICU compare very favorably with the VON Expanded Infants Database. Despite the high acuity and complexity of the patient population, risk-adjusted data continue to improve compared with previous years (data not shown). Evaluating data on a yearly basis helps identify opportunities for continued improvement.

Shrunkened Risk-Adjusted Data^a at Cleveland Clinic Children's Level IV NICU

2015

SMR and Upper and Lower 95% CI



CLD = chronic lung disease, NEC = necrotizing enterocolitis, NICU = Neonatal Intensive Care Unit, SMR = standard mortality rate

^aVermont Oxford Network Expanded Infants Database

Pediatric Nephrology

The Judith M. Power Dialysis Center at Cleveland Clinic Children's Hospital for Rehabilitation provides pediatric hemodialysis and peritoneal dialysis services to infants, children, adolescents, and young adults through 21 years of age.

Albumin is a marker that helps in monitoring nutritional status of end-stage renal disease patients. The percentage of patients at or above an albumin level of 3.5 g/dL exceeds the benchmark set forth by the Renal Network.

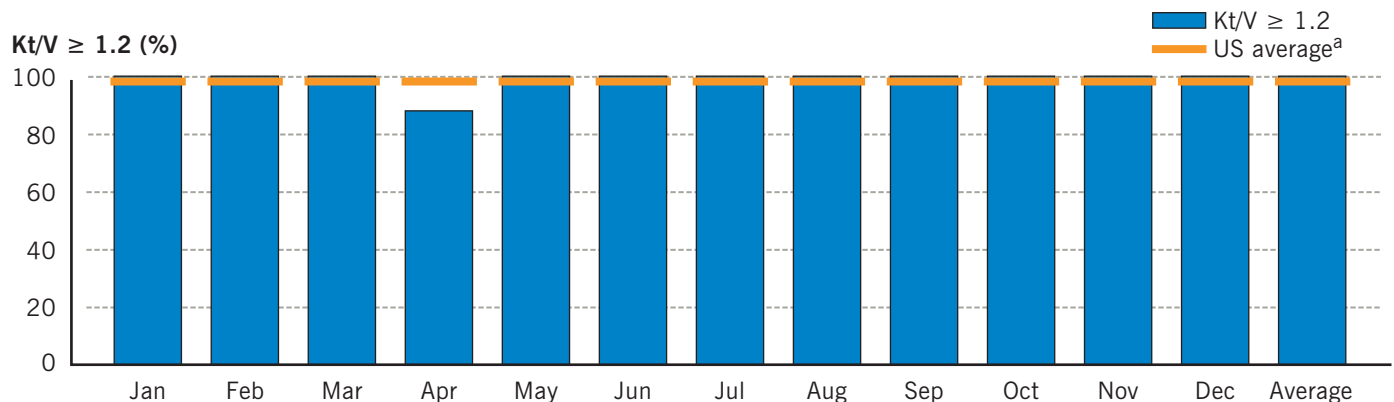
Patients are strictly monitored in order to adhere to the goal hemoglobin of 10–12 g/dL. The percentage of patients with hemoglobin higher than 12 g/dL and lower than 10 g/dL is less than or comparable to the nation's average.

Hemodialysis adequacy is measured in two ways, with urea reduction rate and with Kt/V. Peritoneal dialysis adequacy is measured with Kt/V. In both hemodialysis and peritoneal dialysis, the percentage of patients with adequate dialysis exceeds the national average.

The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative Guidelines, the Centers for Medicare & Medicaid Services, and the Renal Network Clinical Performance Goals provide the benchmarks used for quality improvement initiatives to enhance the outcomes of patients who develop end-stage kidney disease.

Hemodialysis — Adequacy as Measured With Kt/V (N ≥ 7 per Month)

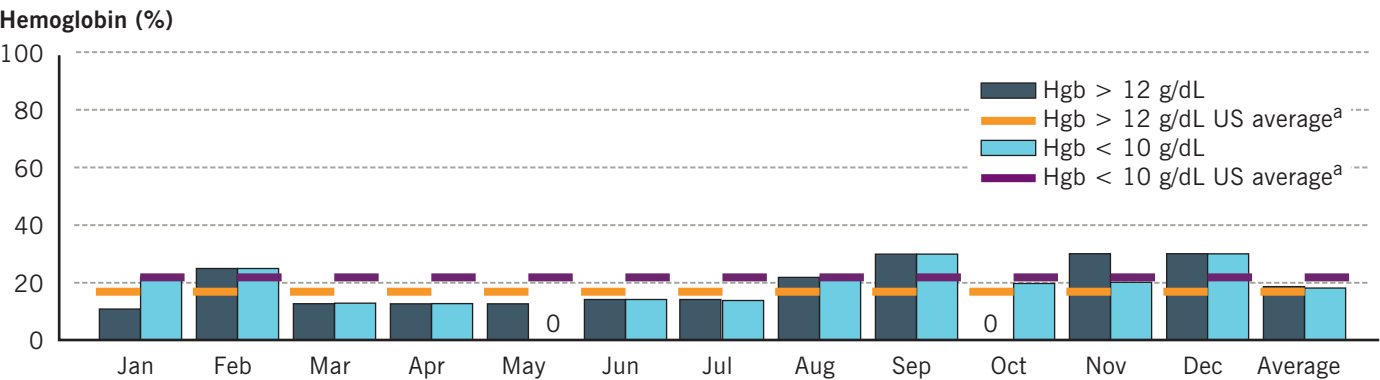
2016



^aDialysis Facility Reports extrapolated from dialysisdata.org

Hemodialysis — Hemoglobin Monitoring (N ≥ 7 per Month)

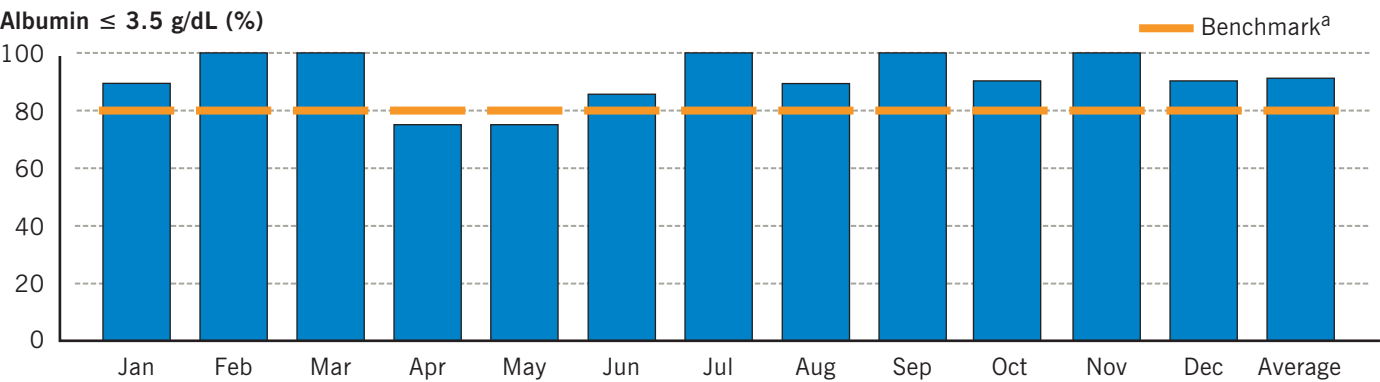
2016



^aDialysis Facility Reports extrapolated from dialysisdata.org

Hemodialysis — Albumin Monitoring (N ≥ 7 per Month)

2016

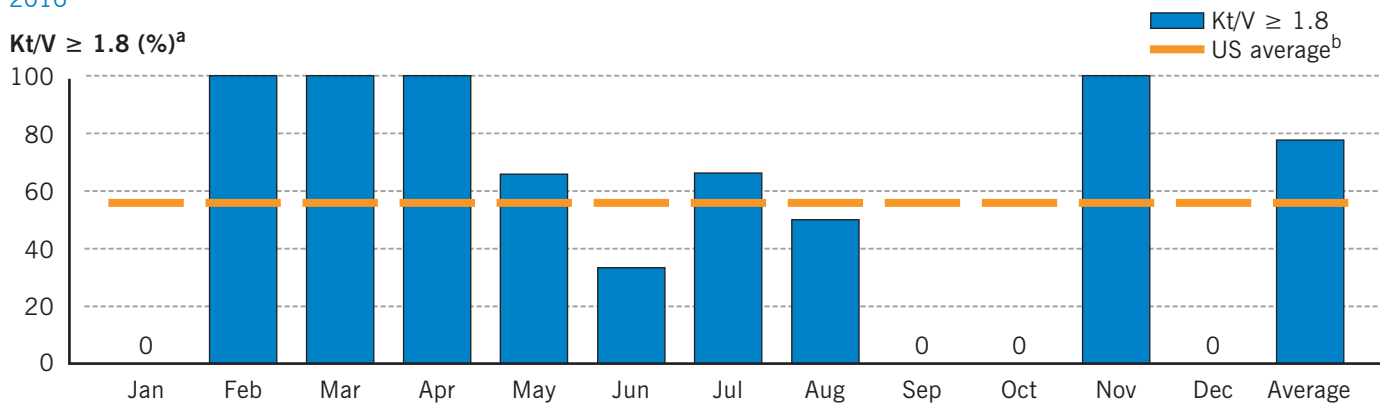


^aThe Renal Network: ESRD Networks 9/10. Clinical Performance Goals 2012–2013

Peritoneal Dialysis — Adequacy as Measured With Kt/V (N ≥ 4 per Month)

2016

Kt/V ≥ 1.8 (%)^a



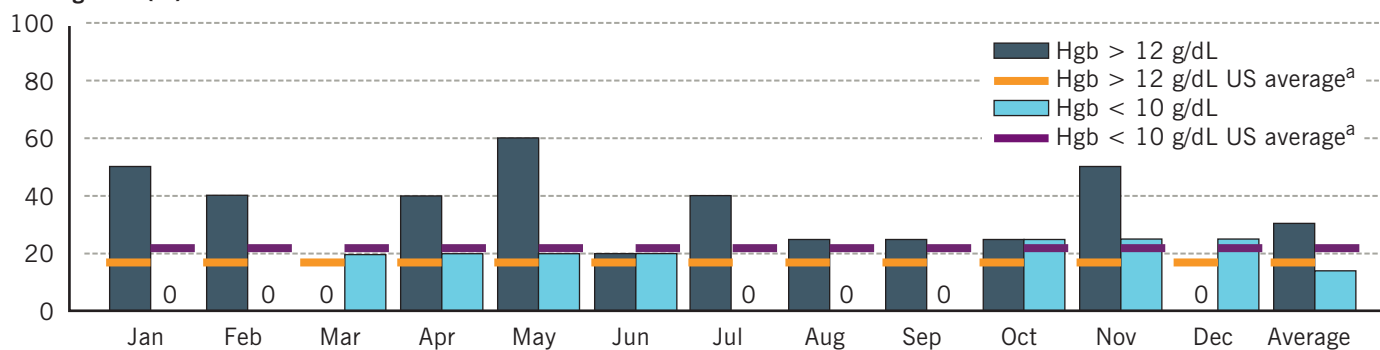
^aKt/V is checked every 3 months in pediatric patients. None of the patients had Kt/V checked during the months of January, September, October, and December.

^bDialysis Facility Reports extrapolated from dialysisdata.org

Peritoneal Dialysis — Hemoglobin Monitoring (N ≥ 4 per Month)

2016

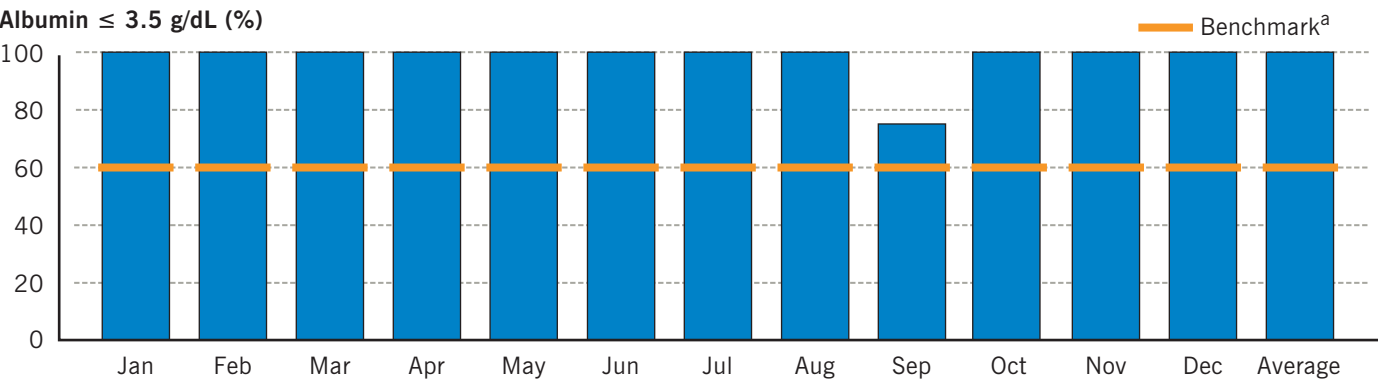
Hemoglobin (%)



^aDialysis Facility Reports extrapolated from dialysisdata.org

Peritoneal Dialysis — Albumin Monitoring (N ≥ 4 per Month)

2016



^aThe Renal Network: ESRD Networks 9/10. Clinical Performance Goals 2012 – 2013

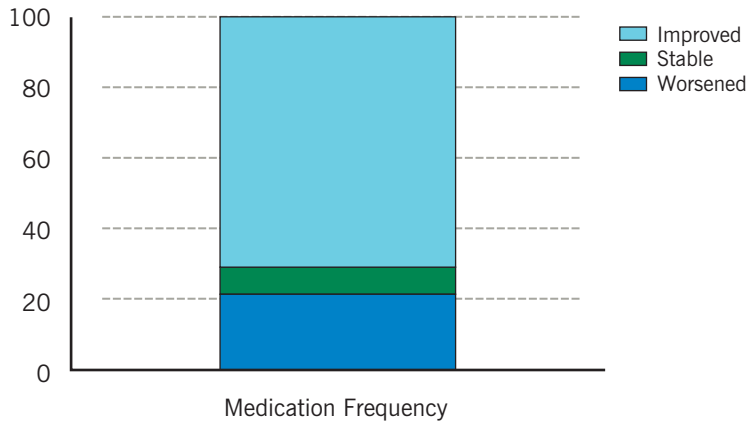
Pediatric Neurological Disorders

Pediatric Headache

Change in Frequency of Headache Medications (N = 338)

Treatment Dates: January 2014 – December 2016

Patients (%)

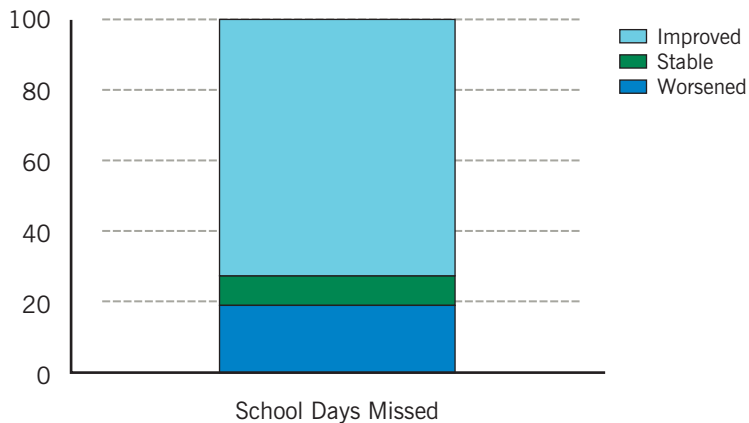


Among 338 pediatric patients treated for headache, 71% showed improvement in the frequency of headache medication doses used. Improvement was defined as any decrease in headache medication frequency in patients who were on medication at initial assessment. Mean duration of follow-up was 226 days (range, 28–953).

Change in Frequency of School Days Missed (N = 220)

Treatment Dates: January 2014 – December 2016

Patients (%)



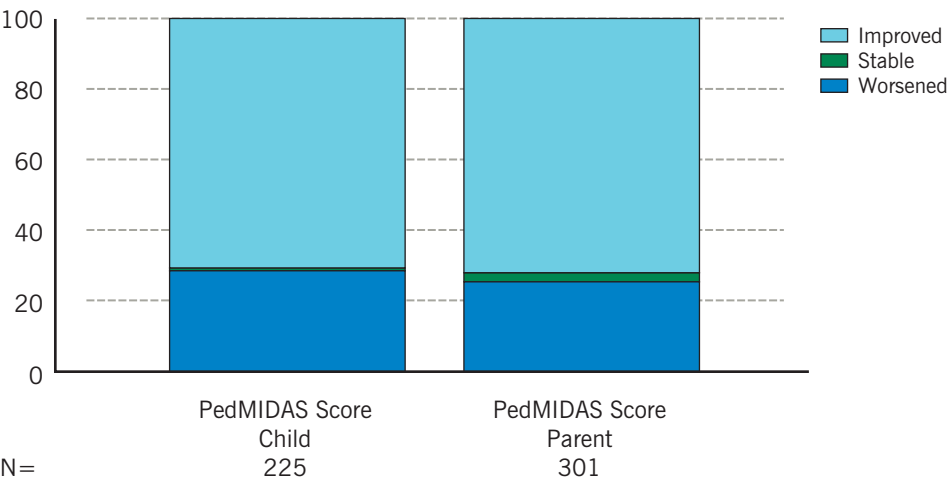
Among 220 pediatric patients treated for headache, 73% showed improvement in the number of school days missed. Improvement was defined as any decrease in school days missed in patients with school absences at initial assessment. Mean duration of follow-up was 252 days (range, 91–936).

Pediatric Neurological Disorders

Change in Headache Disability

Treatment Dates: January 2014 – December 2016

Patients (%)



PedMIDAS = Pediatric Migraine Disability Assessment

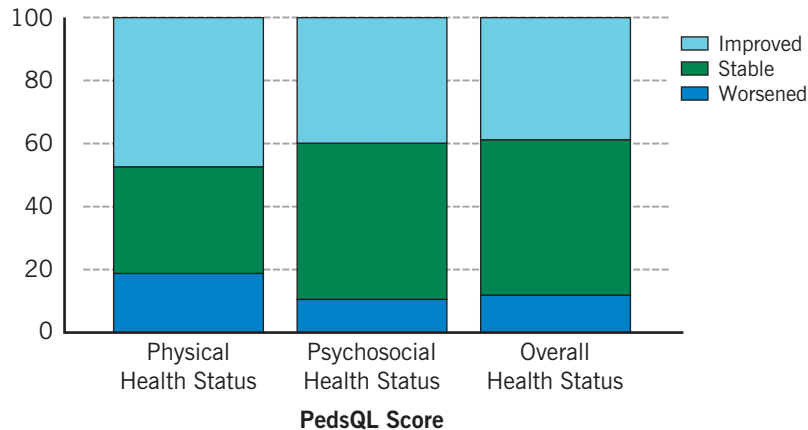
Among 225 pediatric patients with child-reported scores, 71% showed improvement in total Pediatric Migraine Disability Assessment (PedMIDAS) score. Improvement was defined as any decrease in the PedMIDAS score in patients with a baseline score > 0. Median duration of follow-up was 261 days (range, 89–951).

Among 301 pediatric patients with parent-reported scores, 72% showed improvement in total PedMIDAS score. Improvement was defined as any decrease in the PedMIDAS score in patients with a baseline score > 0. Median duration of follow-up was 254 days (range, 91–951).

Change in Quality of Life After Treatment for Headache (Parent-Reported)

Treatment Dates: January 2014 – December 2016

Patients (%)



N = 586 617 623

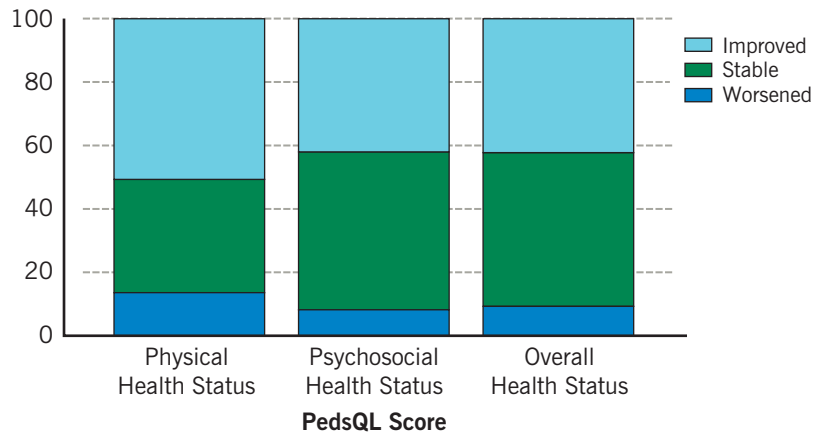
PedsQL = Pediatric Quality of Life Inventory

Among pediatric patients treated for headache, approximately 40% to 50% showed improvement in quality of life compared with their initial visit, as measured with the parent version of PedsQL™ (Pediatric Quality of Life Inventory™). The PedsQL is a 0 to 100 scale with higher scores indicating greater health-related quality of life. Clinically meaningful change was defined as one-half a standard deviation of the initial scores.¹ The median duration of follow-up was 229 to 230 days (range, 15–1077).

Change in Quality of Life After Treatment for Headache (Child-Reported)

Treatment Dates: January 2014 – December 2016

Patients (%)



N = 433 462 449

PedsQL = Pediatric Quality of Life Inventory

Among pediatric patients treated for headache, approximately 40% to 50% showed improvement in quality of life compared with their initial visit, as measured with the child version of PedsQL. Clinically meaningful change was defined as one-half a standard deviation of the initial scores.¹ The median duration of follow-up was 225 to 228 days (range, 15–1077).

Reference

1. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care*. 2003 May;41(5):582-592.

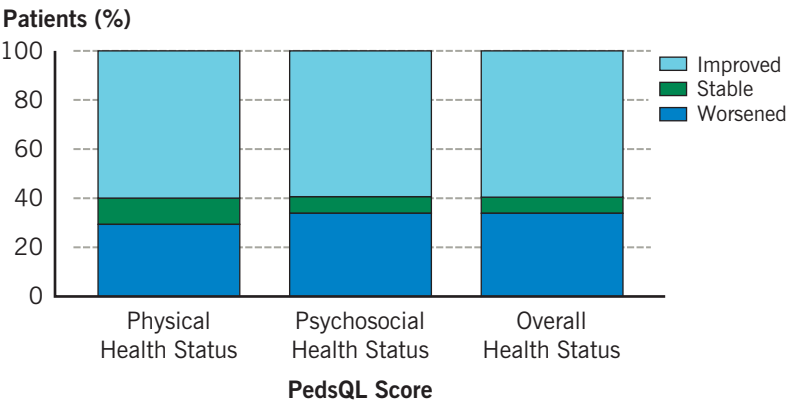
Pediatric Neurological Disorders

Pediatric Syncope

Autonomic disorders are now being recognized in increasing numbers in children and adolescents. However, disease characteristics, diagnostic criteria, and therapies are just evolving and remain largely undefined. Cleveland Clinic's Pediatric Neurology Center has established a comprehensive pediatric autonomic disorders program to address the unique needs of this group of pediatric patients.

Change in Quality of Life After Treatment for Syncope (N = 133)

Treatment Dates: September 2007 – December 2016



PedsQL = Pediatric Quality of Life Inventory

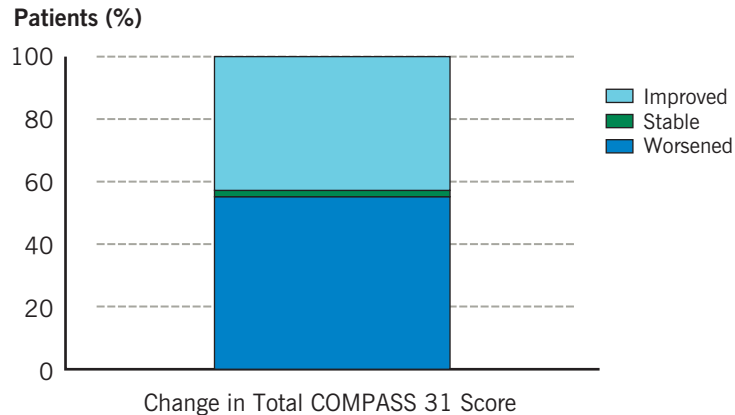
Among pediatric patients treated for syncope with multimodal treatment (medications, clinical psychology, and physical therapy), approximately 60% showed improvement in quality of life compared with their initial visit, as measured with the parent version of PedsQL, a 0 to 100 scale with higher scores indicating greater health-related quality of life. The median duration of follow-up was 561 days (range, 30–2557). Clinically meaningful change was defined as one-half a standard deviation of the initial scores,¹ or ≥ 13 points. N = syncope patients who had at least 2 visits with PedsQL data.

Reference

1. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care*. 2003 May;41(5):582-592.

Change in Symptom Severity After Treatment for Syncope (N = 51)

Treatment Dates: January 2015 – December 2016



COMPASS 31 = Composite Autonomic Symptom Score

Autonomic symptom severity was assessed using the Composite Autonomic Symptom Score (COMPASS 31) starting January 2015. The COMPASS 31 is a patient-reported measure of autonomic symptoms with total scores ranging from 0 to 100; lower scores indicate less severe symptoms. Over this period, 45% of patient scores were stable or improved. Median duration of follow-up was 296 days (range, 52–616). Clinically meaningful change was defined as one-half a standard deviation of the baseline scores,¹ or a total score change ≥ 7 points. N = syncope patients with COMPASS 31 data available over at least 2 visits.

Reference

1. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care*. 2003 May;41(5):582-592.

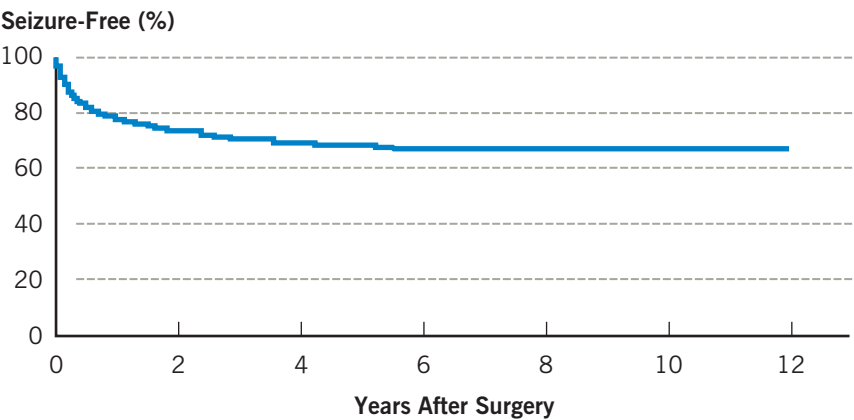
Pediatric Neurological Disorders

Seizure Outcomes in Surgically Treated Adult and Pediatric Epilepsy Patients

Long-term chances of achieving and maintaining seizure-freedom following various types of epilepsy surgery are shown in the following graphs. Whenever possible, the Epilepsy Center's data were compared with national published data. Seizure outcomes were classified using the widely accepted Engel classification¹ of seizure-freedom (seizure-free = Engel class 1).

Long-Term Seizure-Freedom Following Temporal Lobe Epilepsy Surgery (N = 772)

Surgical Dates: 2000 – 2014



Temporal lobe resections are the most commonly performed epilepsy surgeries for medically intractable epilepsy. More than 65% of patients remain seizure-free a decade or more after surgery. Median duration of follow-up was 3.5 years (range, 0.5–16.7). The last follow-up for which data are available was Aug. 16, 2016.

Reference

1. Engel J, Jr., Van Ness PC, Rasmussen TB, Ojemann LM. Outcome with respect to epileptic seizures. In: Engel J, Jr., ed. *Surgical Treatment of the Epilepsies*. 2nd ed. New York, NY: Raven Press; 1993:609-621.

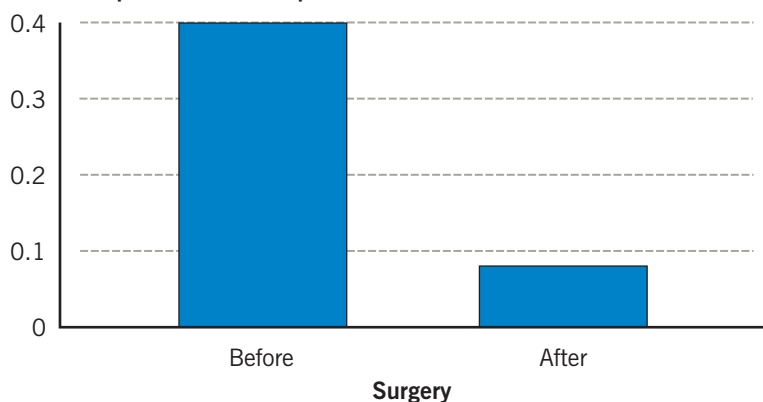
Pediatric Epilepsy: Effect of Treatment on Healthcare Utilization

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 = 900)

2009 – 2016

Mean Hospitalization Rate (per 3 Months)

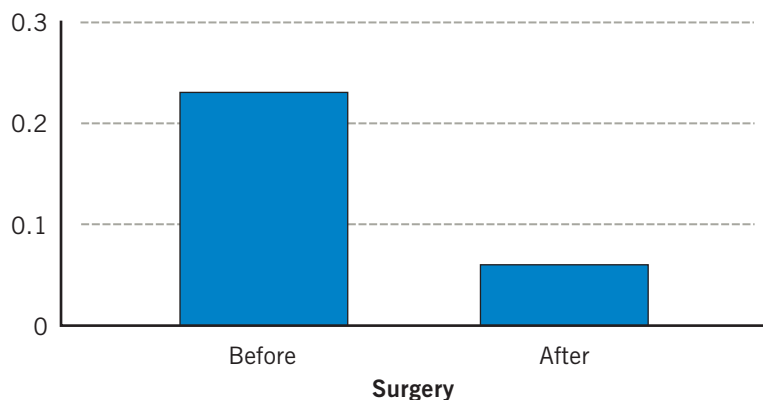


Healthcare utilization improved significantly with epilepsy surgery. The number of hospitalizations decreased from a mean of 0.4 in the 3 months preceding surgery to a mean of 0.08 after surgery ($P < 0.0001$), an 80% reduction in frequency of hospitalizations. N = pediatric patients with at least 6 months of follow-up. Mean duration of follow-up was 23 months.

Emergency Room Visits in Surgically Treated Pediatric Epilepsy Patients (N = 904)

2009 – 2016

Mean ER Visit Rate (per 3 Months)



There was a significant reduction in the frequency of emergency room visits, from a mean of 0.23 visits in 3 months preceding surgery to 0.06 after surgery ($P < 0.0001$), a more than 74% reduction in frequency of emergency room visits. N = pediatric patients with at least 6 months of follow-up. Mean duration of follow-up was 23 months.

Pediatric Orthopaedic Surgery

Pediatric Shoulder and Hand/Upper Extremity Surgery, 2009 – 2016

Procedure	Yearly Volume		Average Age, Years		Males/Females, %		Length of Stay, Days		Discharged Home, %	
	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016
Open Shoulder Surgery	34	38								
Capsulorrhaphy	12	12	16.1	15.4	79/21	83/17	-	-	-	-
Treatment of shoulder fracture	14	21	14.9	14.6	85/15	90/10	-	-	100	100
Other treatment	8	5	12.7	12.8	56/44	80/20	-	-	-	-
Arthroscopic Shoulder Surgery	57	49								
Capsulorrhaphy	30	19	16.1	15.8	75/25	79/21	-	-	-	-
SLAP repair	27	30	15.9	15.9	79/21	83/17	-	-	100	100
Open Hand/UE Surgery	381	348								
Trigger finger release	13	7	3.7	3.6	46/54	71/29	-	-	-	-
Fracture treatment	236	232	10.1	10.5	65/35	63/37	0.9	1.0	100	100
Humeral shaft	65	52	6.6	7.1	50/50	56/44	0.8	0.8	100	100
Distal humerus	3	9	11.6	14.0	84/16	78/22	-	-	-	-
Radial head	5	7	9.4	7.7	42/58	29/71	-	-	-	-
Proximal ulna	5	3	11.1	15.3	63/37	33/67	-	-	-	-
Radial or ulnar shaft	44	45	9.0	9.2	66/34	58/42	-	-	100	100
Distal radius	48	44	11.0	11.0	72/28	64/36	-	-	100	100
Scaphoid	10	10	15.9	15.5	90/10	90/10	-	-	-	-
Hand or finger	56	62	13.1	12.6	74/26	69/31	-	-	100	100
Mass excision	24	29	12.5	13.4	41/59	45/55	-	-	100	100
Other treatment	108	80	8.4	9.4	62/38	78/22	-	-	100	100
Arthroscopic Hand/UE Surgery	4	5								

SLAP = superior labrum from anterior to posterior, UE = upper extremity

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

Procedure	In-Hospital Mortality, %		30-Day Readmission Rate, %		30-Day Reoperation Rate, %		90-Day Infection Rate, %		Preop Function		90-Day Postop Function	
	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016
Open Shoulder Surgery												
Capsulorrhaphy	-	-	-	-	-	-	-	-	-	-	-	-
Treatment of shoulder fracture	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-
Other treatment	-	-	-	-	-	-	-	-	-	-	-	-
Arthroscopic Shoulder Surgery												
Capsulorrhaphy	-	-	-	-	-	-	-	-	-	-	-	-
SLAP repair	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-
Open Hand/UE Surgery												
Trigger finger release	-	-	-	-	-	-	-	-	-	-	-	-
Fracture treatment	0.0	0.0	0.5	0.0	1.4	0.9	-	-	-	-	-	-
Humeral shaft	0.0	0.0	-	-	-	-	-	-	-	-	-	-
Distal humerus	-	-	-	-	-	-	-	-	-	-	-	-
Radial head	-	-	-	-	-	-	-	-	-	-	-	-
Proximal ulna	-	-	-	-	-	-	-	-	-	-	-	-
Radial or ulnar shaft	0.0	0.0	0.0	0.0	2.6	0.0	-	-	-	-	-	-
Distal radius	0.0	0.0	0.3	0.0	2.1	0.0	-	-	-	-	-	-
Scaphoid	-	-	-	-	-	-	-	-	-	-	-	-
Hand or finger	0.0	0.0	0.5	0.0	0.5	1.6	-	-	-	-	-	-
Mass excision	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-	-
Other treatment	0.0	0.0	1.0	0.0	0.8	1.3	-	-	-	-	-	-
Arthroscopic Hand/UE Surgery												

SLAP = superior labrum from anterior to posterior, UE = upper extremity

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to arm problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

Pediatric Orthopaedic Surgery

Pediatric Hip, Knee, and Foot/Ankle Surgery, 2009 – 2016

Procedure	Yearly Volume		Average Age, Years		Males/ Females, %		Length of Stay, Days		Discharged Home, %	
	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016
Open Hip Surgery	61	37								
Treatment of hip or pelvis fracture	5	2	10.6	12.5	69/31	100/0	-	-	-	-
Other treatment	56	35	8.6	9.7	47/53	71/29	3.4	2.8	99	100
Arthroscopic Hip Surgery	35	32								
Open Knee Surgery	128	116								
Treatment of periarticular knee fracture	20	15	9.5	10.1	80/20	73/27	-	-	-	-
Other treatment	108	101	13.4	14.0	48/52	45/55	3.5	2.2	99	100
Arthroscopic Knee Surgery	308	273								
ACL reconstruction	159	160	15.5	15.6	47/53	48/52	-	-	100	100
Meniscectomy	66	41	15.5	16.0	64/36	76/24	-	-	100	100
Meniscus repair	16	15	15.3	15.7	66/34	93/7	-	-	-	-
Chondroplasty	22	25	14.6	15.1	54/46	40/60	-	-	100	100
Other treatment	45	32	15.1	14.8	44/56	50/50	-	-	100	100
Open Foot/Ankle Surgery	254	242								
Flat foot or cavus foot correction	21	14	12.8	14.2	54/46	57/43	-	-	-	-
Fracture treatment	65	61	13.6	13.6	71/29	64/36	-	-	100	98
Tibia or fibula	39	49	13.4	13.9	74/26	67/33	-	-	100	100
Ankle	10	3	14.2	15.7	63/37	67/33	-	-	-	-
Foot or toes	16	9	13.7	11.3	68/32	44/56	-	-	-	-
Excision of leg or ankle tumor	11	14	13.0	12.1	55/45	50/50	-	-	-	-
Excision of foot or toe tumor	9	4	12.4	12.5	53/47	25/75	-	-	-	-
Other treatment	148	149	10.8	12.1	49/51	42/58	2.9	2.4	100	100
Arthroscopic Foot/Ankle Surgery	5	3								

ACL = anterior cruciate ligament

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **Yearly Volume:** number of surgeries performed per year
- **Average Age, Years:** average patient age
- **Males/Females, %:** males-to-females ratio
- **Length of Stay, Days:** average length of stay in days for inpatient surgeries
- **Discharged Home, %:** percentage of patients who were discharged home or to home care

Procedure	In-Hospital Mortality, %		30-Day Readmission Rate, %		30-Day Reoperation Rate, %		90-Day Infection Rate, %		Preop Function		90-Day Postop Function	
	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016	2009-15	2016
Open Hip Surgery												
Treatment of hip or pelvis fracture	-	-	-	-	-	-	-	-	-	-	-	-
Other treatment	0.0	0.0	3.4	11.8	3.6	2.9	4.8	0.0	-	-	-	-
Arthroscopic Hip Surgery												
Open Knee Surgery												
Treatment of periarticular knee fracture	-	-	-	-	-	-	-	-	-	-	-	-
Other treatment	0.0	0.0	2.0	1.0	1.1	2.0	0.8	0.0	-	-	-	-
Arthroscopic Knee Surgery												
ACL reconstruction	0.0	0.0	0.6	0.6	0.4	0.6	0.3	0.0	-	-	-	-
Meniscectomy	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Meniscus repair	-	-	-	-	-	-	-	-	-	-	-	-
Chondroplasty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Other treatment	0.0	0.0	1.0	0.0	0.6	0.0	0.0	0.0	-	-	-	-
Open Foot/Ankle Surgery												
Flat foot or cavus foot correction	-	-	-	-	-	-	-	-	-	-	-	-
Fracture treatment	0.0	0.0	0.5	0.0	0.4	0.0	-	-	-	-	-	-
Tibia or fibula	0.0	0.0	0.8	0.0	0.7	0.0	-	-	-	-	-	-
Ankle	-	-	-	-	-	-	-	-	-	-	-	-
Foot or toes	-	-	-	-	-	-	-	-	-	-	-	-
Excision of leg or ankle tumor	-	-	-	-	-	-	-	-	-	-	-	-
Excision of foot or toe tumor	-	-	-	-	-	-	-	-	-	-	-	-
Other treatment	0.0	0.0	1.2	0.7	0.8	0.0	-	-	-	-	-	-
Arthroscopic Foot/Ankle Surgery												

ACL = anterior cruciate ligament

Data reflect outcomes of care provided by Cleveland Clinic physicians irrespective of practice location, including Cleveland Clinic main campus, Cleveland Clinic northeast Ohio regional hospitals, and Cleveland Clinic Florida. Pediatric patients are younger than 18 years. A dash indicates that insufficient data were available to calculate the measure with reasonable accuracy.

Column descriptions:

- **Procedure:** type of surgical procedure performed
- **In-Hospital Mortality, %:** rate of patient mortality prior to discharge from the hospital encounter during which surgery occurred
- **30-Day Readmission Rate, %:** rate of readmission as an inpatient for any reason to a Cleveland Clinic hospital within 30 days of discharge
- **30-Day Reoperation Rate, %:** rate of reoperation on the same joint within 30 days of discharge
- **90-Day Infection Rate, %:** rate of infection within 90 days of surgery
- **Preop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems prior to surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)
- **90-Day Postop Function:** how much physical activities (eg, daily activities, housework, work outside the home, and exercising) are free of limitations due to leg problems 90 days after surgery; scores range from 0 (extreme limitations, low function) to 10 (no limitations, high function)

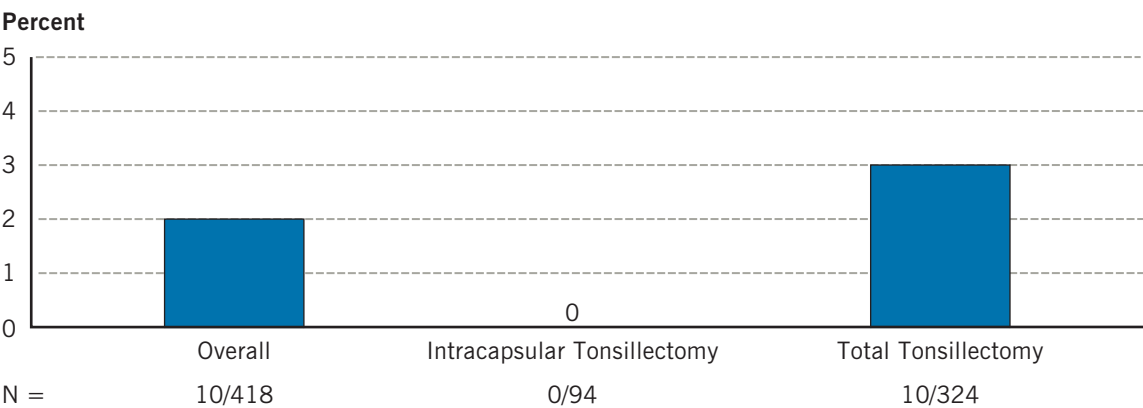
Pediatric Post-Tonsillectomy Bleeding Rate With or Without Adenoidectomy

Tonsillectomy with adenoidectomy is the second most common surgical procedure performed by otolaryngologists. In 2011, the Clinical Practice Guideline: Tonsillectomy in Children was published by the American Academy of Otolaryngology–Head and Neck Surgery,¹ which recommended the standardized use of ibuprofen along with acetaminophen for postoperative pain control. Due to the possibility of increased bleeding with the use of ibuprofen, this recommendation has been met with resistance because the most common risk of tonsil surgery is secondary hemorrhage. In 2013, Cleveland Clinic’s Pediatric Otolaryngology section standardized postoperative pain control with acetaminophen and ibuprofen. In 2016, surgeons performed 418 tonsillectomies (with or without adenoidectomy), of which 324 were total tonsillectomies and 94 were intracapsular tonsillectomies.

The bleeding rate in previously published Cleveland Clinic outcomes data ranged between 0.3% and 1.5% from 2003 to 2010 (N = 2301). The overall bleed rate in 2016 was 2%, not a statistically significant change with the addition of ibuprofen. Compared with a national average of 2% to 5%, the section’s secondary hemorrhage rates remain low.²

Control of Secondary Hemorrhage

2016



References

1. Baugh RF, Archer SM, Mitchell RB, Rosenfeld RM, Amin R, Burns JJ, Darrow DH, Giordano T, Litman RS, Li KK, Mannix ME, Schwartz RH, Setzen G, Wald ER, Wall E, Sandberg G, Patel MM; American Academy of Otolaryngology-Head and Neck Surgery Foundation. Clinical practice guideline: tonsillectomy in children. *Otolaryngol Head Neck Surg*. 2011 Jan;144(1 Suppl):S1-S30.
2. Audit NP. Impact of NICE guidance on rates of haemorrhage after tonsillectomy: an evaluation of guidance issued during an ongoing national tonsillectomy audit. *Qual Saf Health Care*. 2008 Aug;17(4):264-268.

Pediatric Palliative Care

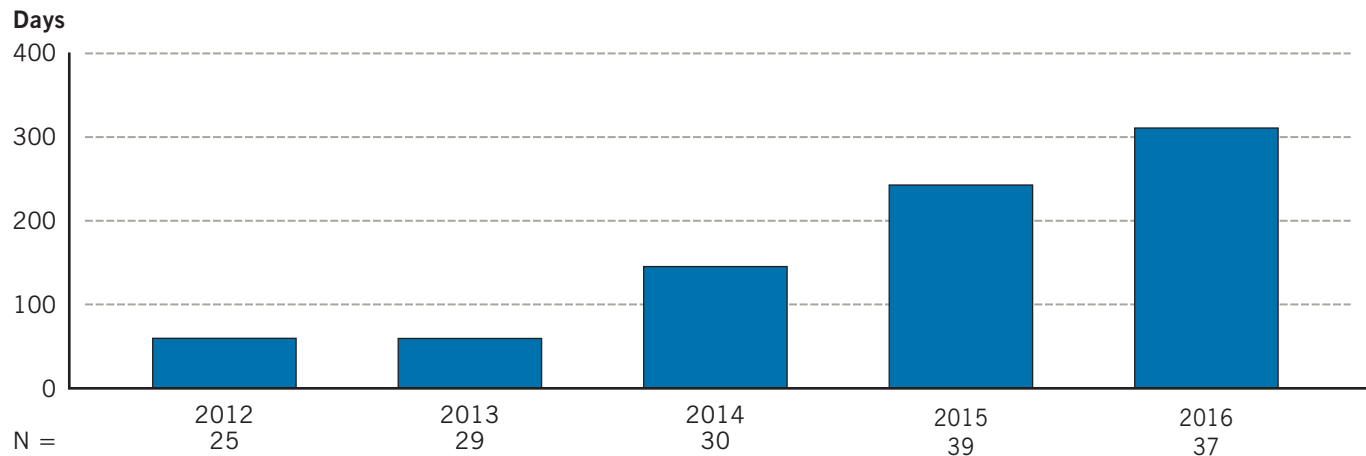
Cleveland Clinic Children's pediatric palliative care team continues to provide psychosocial support to patients with serious medical illness and their families, as well as management of distressing symptoms and coordination of care throughout their disease trajectory. Recent efforts to promote access for qualifying patients include:

- Educational presentations including Grand Rounds, resident lectures, institute and department presentations, and morbidity and mortality conferences
- Standardization of services and documentation
- Routine participation in subspecialty multidisciplinary conferences
- Optimization of electronic medical record functionality

Consultation earlier in the patient's disease course provides an opportunity to establish a therapeutic alliance, broach difficult conversations, and weigh risks and benefits with patients, families, and involved medical personnel. Early consultation is of utmost importance when addressing end of life care needs. As indicated in the graph below, there has been a significant increase in the average duration of patient engagement in this population over the past 5 years.

Average Length of Consult in Days at Time of Death

2012 – 2016



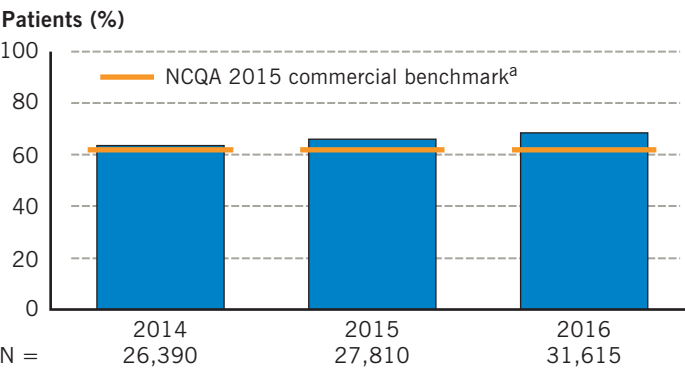
Pediatric Primary Care

Adolescent Well-Care Visits

The Primary Care Pediatrics Department exceeds the 90th percentile nationally for annual well-care visits for patients ages 12–21 years and has shown improvement over the past year.^a

Adolescent Well-Care Visits

2014 – 2016



NCQA = National Committee for Quality Assurance

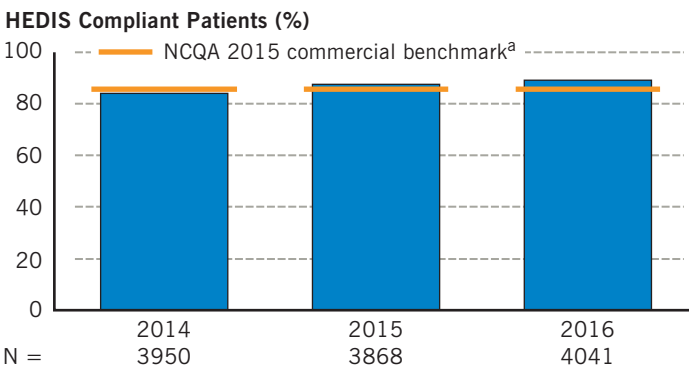
^aBenchmark: National Committee for Quality Assurance. ncqa.org

Adolescent Immunization

The Healthcare Effectiveness Data and Information Set measurement for adolescent immunization includes one dose of Tdap (tetanus, diphtheria, and pertussis) and one dose of meningococcal vaccine by the child’s 13th birthday. At Cleveland Clinic Children’s, immunization rates continue to improve even as the adolescent patient population grows larger.

Adolescent Immunization

2014 – 2016



HEDIS = Healthcare Effectiveness Data and Information Set,
NCQA = National Committee for Quality Assurance

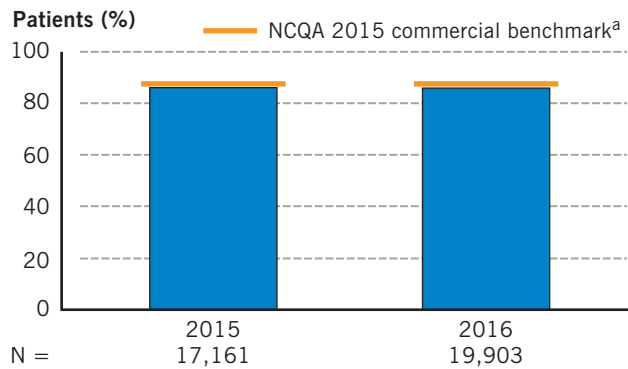
^aBenchmark: National Committee for Quality Assurance. ncqa.org

Well-Child Care Visits

Primary Care Pediatrics also provides excellent rates of well-child care visits for patients ages 3–6. In 2016, 85.9% of these patients had a well-child care visit with a primary care provider, which closely aligns with the national 90th percentile.

Well-Child Care Visits

2015 – 2016



NCQA = National Committee for Quality Assurance

^aBenchmark: National Committee for Quality Assurance. ncqa.org

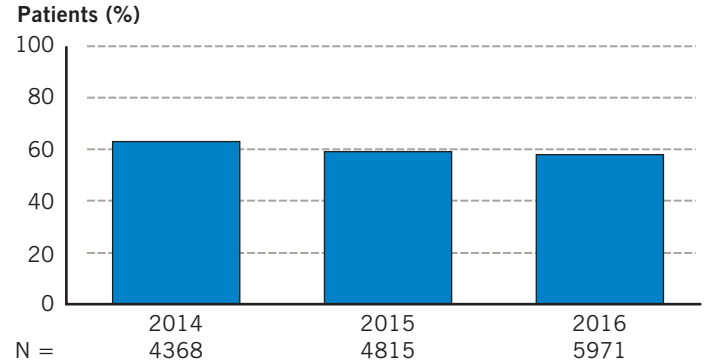
Childhood Immunization Status — Combo 10

The HEDIS metric for immunizing children before their second birthday includes all doses of 10 different vaccines (4 diphtheria, tetanus, pertussis; 4 pneumococcal; 3–4 *Haemophilus influenzae* type b; 3 hepatitis B; 3 inactive polio vaccine; 2–3 rotavirus; 2 influenza; 2 hepatitis A; 1 varicella; and 1 measles, mumps, rubella).

Primary Care Pediatrics previously exceeded the national 90th percentile, but rates dropped during 2015–2016. Although the department still exceeds the national 50th percentile, it is dedicated to improving vaccination rates and protecting patients from disease.

Childhood Immunization

2014 – 2016



Asthma Control Testing

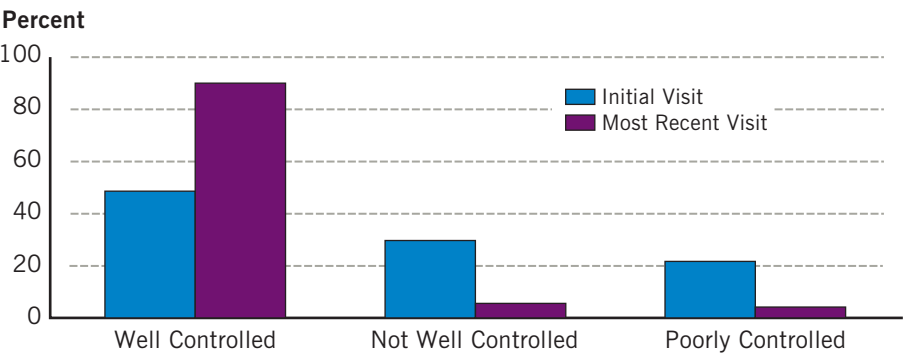
The Asthma Control Test (ACT) is a validated instrument used by the Center for Pediatric Pulmonary Medicine to assess asthma symptom control. It measures daytime and nocturnal symptom frequency, use of rescue beta-agonists, functional assessment, and self-assessment of activity-related symptoms. A composite score of test responses from the child and a parent is used for children aged 4–11 years, while children ≥ 12 years provide a self-assessment.

The ACT provides a longitudinal measure of asthma control and groups patients into three asthma control categories: well controlled, not well controlled (reflecting need for further clinical improvement), and poorly controlled (indicating more severe functional impairment, elevated risk of exacerbation, and likelihood of increased health resource utilization).

Children referred to the Center for Pediatric Pulmonary Medicine for asthma management typically have more severe asthma and multiple comorbidities, and often have required considerable prior health resource utilization, including emergency department visits and multiple hospitalizations. In 2016, 21.7% of patients new to the center were poorly controlled, but only 4.2% were poorly controlled at follow-up. Of the new patients who presented in 2016, 29.7% were in the not well controlled category, with only 5.6% remaining not well controlled at follow-up. The percentage of not well controlled and poorly controlled patients who presented to the center increased from 34.7% in the 2012–2015 cohort to 51.4% in 2016. At follow-up in 2016, 90% demonstrated ACT scores in the well controlled range at follow-up, surpassing the 2012–2015 rate of 81.1%. This improvement demonstrates that even though patient severity scores continue to reflect referral of more severely ill patients, management by center clinicians continued to promote even further improvement in patients' functional status as measured by ACT scores in the well controlled category at follow-up center visits.

Asthma Control Test – Defined Asthma Severity Class (N = 138)

2016



Pediatric Bronchoscopy Outcomes

2015 – 2016

Complications	2015 (N = 126)		2016 (N = 91)	
	N	%	N	%
Major	1	0.79	0	0
Minor	3	2.38	1	1.09
No complications	122	96.83	90	98.91

Bronchoscopy is an essential procedure performed by pulmonologists to visually examine the lungs and airways. Primarily used for diagnosis of infectious, structural, and functional abnormalities of airways and peripheral lung tissue, it can also be used for treatment of specific conditions. Information obtained during bronchoscopy can contribute to definitive diagnosis in about 80% of cases. Patient safety and comfort are primary concerns for all patients. Many Center for Pediatric Pulmonary Medicine patients have complex multisystem illnesses or require ICU level care, and a higher rate of procedural complications might be expected. Other than transient hypoxemia, multiple series report complication rates < 5%.¹ Common minor complications include airway bleeding, epistaxis, and excessive cough. Major complications include apnea, bradycardia, postprocedure atelectasis, and sustained oxygen desaturations < 90% related to laryngospasm or bronchospasm. In 2015, the bronchoscopy service had only one major complication (0.79%) and three minor complications including cough or transient low grade fever (2.38%). In 2016, only one patient experienced fever — a minor complication (1.09%).

¹Midulla F, de Blic J, Barbato A, Busch A, Eber E, Kotecha S, Haxby E, Moretti C, Pohunek P, Ratjen F; ERS Task Force. Flexible endoscopy of paediatric airways. *Eur Respir J.* 2003 Oct;22(4):698-708.

Collaborative Care With Pediatric Rheumatology, Neurology, and Epilepsy Improves Outcomes in Immune-Mediated Epilepsy

At Cleveland Clinic, pediatric rheumatology works in collaboration with specialized neurology and epilepsy services in the care of patients with immune-mediated neurologic diseases. Patients with seizures present a clinical challenge; their etiology spans paraneoplastic, antibody mediated, typical or atypical Rasmussen encephalitis, or idiopathic from presumed encephalitis. Patients with intractable epilepsy take multiple forms of antiepileptic medication. Additional treatments performed in an effort to lower seizure burden include:

- The measured use of immune-modulating therapy
- Surgical interventions performed to remove an inciting tumor in paraneoplastic disease or a resection of late-stage Rasmussen encephalitis.

The table at right displays 13 individual seizure patients who were treated with immune-modulating therapy and followed longitudinally at Cleveland Clinic Children's.

Immune-modulating therapies, along with appropriate surgical intervention, serve as adjunctive therapies to antiepileptic treatments and traditional seizure management approaches for patients with certain severe clinical seizure phenotypes.

Immune-Modulating Adjuvant Therapy Outcomes (N = 13)

2016

Patient	Type	Antibody	Seizure Type Before Therapy	Therapy ^a	Surgery	Outcome
1	Paraneoplastic limbic encephalitis	No	Automotor seizures/ L temporal lobe epilepsy	S, I, R	Yes (tumor removal)	Seizure free on 1 antiepileptic
2	Paraneoplastic encephalitis/ antibody mediated	Anti-neuronal	Status epilepticus	S, I, C, T, PI, M	Yes (tumor removal)	Seizure free off medication
3	Antibody mediated	NMDA	R centro-parietal epilepsy	S, I, C, M	No	Seizure free on 1 antiepileptic
4	Antibody mediated	NMDA	Prolonged status epilepticus	S, I, C, PI, M	No	Seizure free at last follow-up on 4 antiepileptics
5	Febrile infection-related epilepsy syndrome	No	New onset refractory status epilepticus	S, I, C, M	No	Seizure free on 3 antiepileptics
6	Atypical Rasmussen encephalitis	No	Refractory epilepsy	S, I, T	Yes (hemispherectomy)	Seizure free on 2 antiepileptics
7	Atypical Rasmussen encephalitis	No	Refractory epilepsy	S, I, T, A	Yes (partial lobectomy)	Refractory epilepsy on 3 antiepileptics
8	Atypical Rasmussen encephalitis	No	Refractory epilepsy	S, I, T, R	No	Refractory epilepsy on 3 antiepileptics
9	Refractory epilepsy	No	Centro-temporal epilepsy, ESES	S, I	No	Relative seizure control on 3 antiepileptics
10	Refractory epilepsy	No	Centro-temporal epilepsy, ESES	S, I, T	No	Seizure free with centro-temporal EEG spikes on 2 antiepileptics
11	Refractory epilepsy	No	ESES	S, I	No	Seizure free on 2 antiepileptics
12	Refractory epilepsy	No	Benign focal discharges, nonconvulsive status, ESES	S, I	No	Seizure free on 3 antiepileptics
13	Refractory epilepsy	No	Refractory generalized and multifocal epilepsy	S, I	No	Relative improvement in severe seizure burden on 2 antiepileptics

ESES = Electrical status epilepticus during sleep

^aTherapies: A = adalimumab, Az = azathioprine, C = cyclophosphamide, I = intravenous immunoglobulin, M = mycophenolate, PI = plasmapheresis, R = rituxan, S = steroids, T = tacrolimus

Pediatric Therapy Services

Cleveland Clinic Children’s Hospital for Rehabilitation Therapy Services

Handwriting Summer Camp

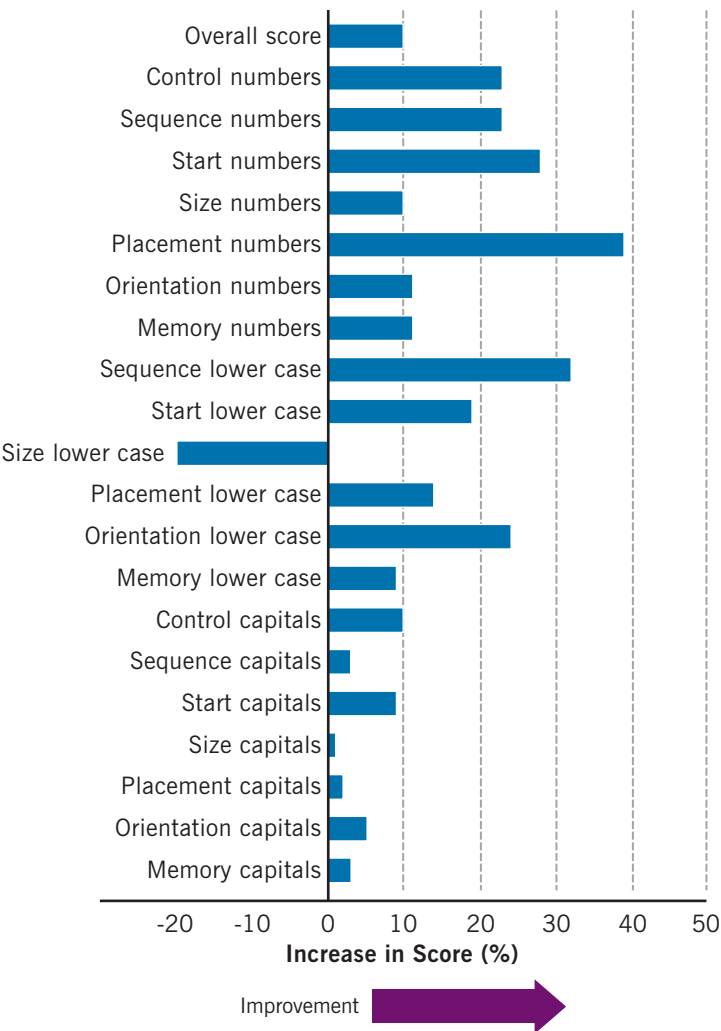
Cleveland Clinic Children’s Hospital for Rehabilitation Therapy Services, Middleburg Heights, offers a handwriting summer camp using the Handwriting Without Tears® (HWT) program, a developmentally based, multisensory printing curriculum for children aged 4–7. The program is run by an occupational therapist trained in the HWT program in a small group setting, allowing for individualized instruction and accelerated learning. Children attend camp twice a week for 5 weeks, for a total of 10 sessions. The goal of the camp is to make handwriting a natural, automatic skill through participating in handwriting mastery activities. Handwriting camp addresses letter formation, size, and spacing, and pencil grip.

In 2016, the camp held two sessions with a total of 11 children participating. The first session was attended by kindergartners and the second by first-graders.

Pre- and postassessments were administered to each of the 11 children using the Handwriting Without Tears Print Tool®. The Print Tool is a one-on-one assessment used to evaluate and remediate capital letters, lowercase letters, and numbers. Data analysis of the Print Tool indicated that 9 of 11 children (81%) made gains in overall score. All participants showed improvement in placement and control of numbers. In addition, families are asked to complete a postcurriculum survey designed to gather information about their satisfaction with the program in improving their child’s handwriting.

Handwriting Camp Outcomes (N = 11)

2016



All families completed and returned the satisfaction surveys, with 82% reporting a noticeable improvement and the remaining 18% reporting somewhat of an improvement in their child’s handwriting at the end of the camp. The 82% reported that they were “extremely satisfied” with the program.

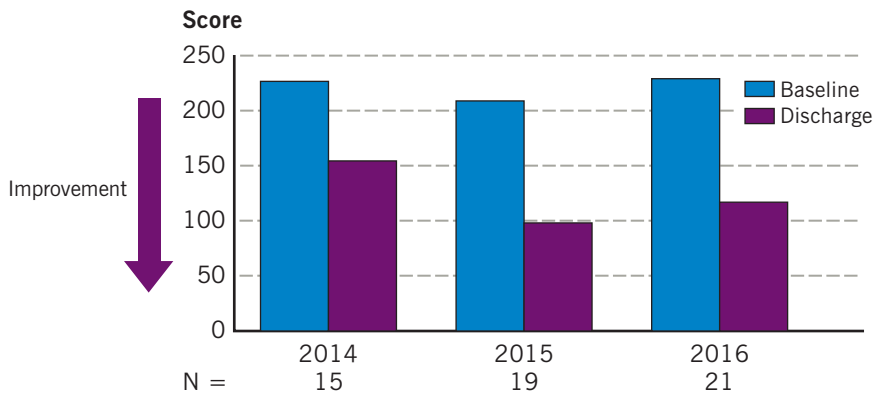
Interactive Metronome Program

Therapy Services, Middleburg Heights, offers Interactive Metronome® (IM), a computer-based program designed to improve timing, attention, and motor control and coordination in children with a wide range of cognitive and physical difficulties. In 2016, 21 patients received IM therapy from occupational therapists certified in IM. The IM assessment was administered before treatment and at discharge.

Analysis of patients' change in raw score from baseline to discharge in 2014–2016 indicated a reduction of 100 points in average raw scores. Lower scores indicate better performance.

Change in Average Raw Score (N = 55)

2014 – 2016

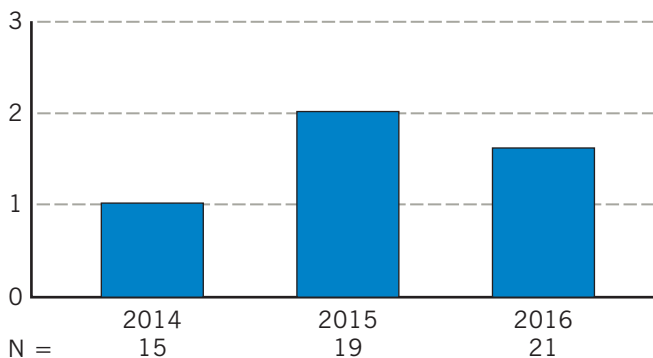


The IM assessment tool consists of 7 descriptive categories for performance. Each category was assigned a number ranging from 1 to 7, with lower numbers indicating better performance. The graphs below summarize group data for patient performance on the IM assessment.

Average Change in Interactive Metronome Descriptive Category (N = 55)

2014 – 2016

IM Category



IM = Interactive Metronome

In 2016, patients demonstrated average performance improvements of 1.62 descriptive categories

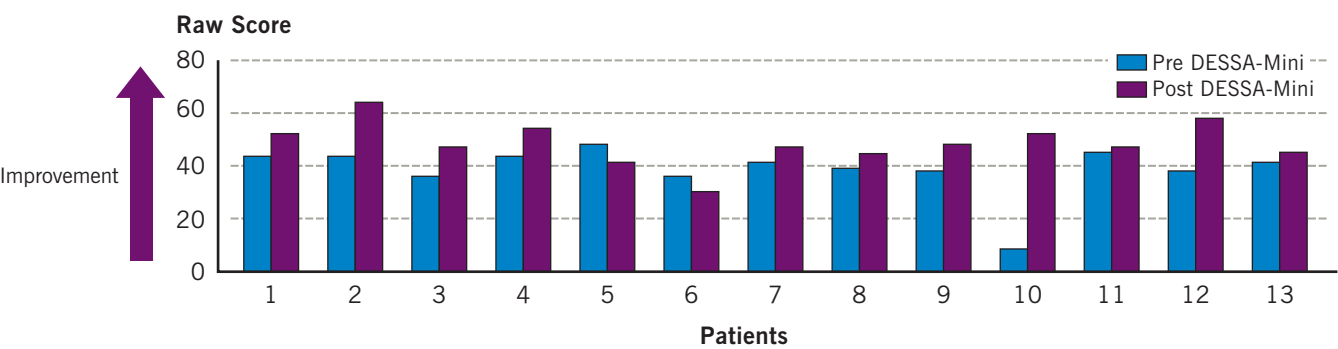
Pediatric Therapy Services

Mindful Movement

Therapy Services, Brunswick, offers a 6-week Mindful Movement program for children aged 5–12. The program is geared toward both current patients and children in the community who could benefit from developing coping skills and relaxation strategies. The program uses deep breathing, movement, focus, and relaxation techniques to promote positive coping and self-regulation. Pre- and postassessments were administered using the Devereux Student Strengths Assessment-Mini (DESSA-Mini). The DESSA-Mini can be used to screen for and monitor progress in the acquisition of social-emotional competencies. The graphs below summarize group data for patient performance on the DESSA-Mini.

Change in DESSA-Mini Raw Score (N = 13)

2016

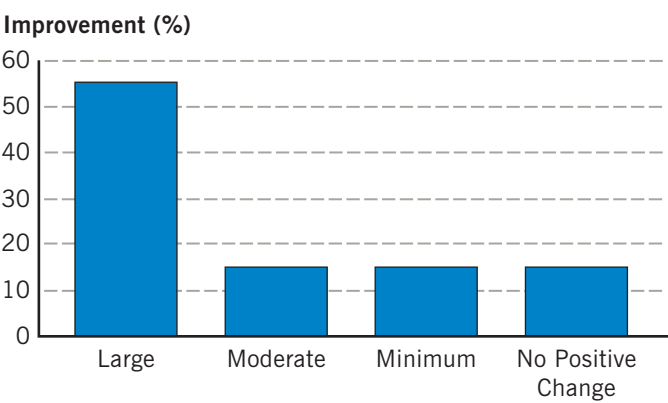


DESSA = Devereux Student Strengths Assessment

Large improvement indicates a T-score increase of 8 or higher, which indicates the supports/interventions are working well.

Improvement on DESSA-Mini

2016



DESSA = Devereux Student Strengths Assessment

Constraint-Induced Movement Therapy

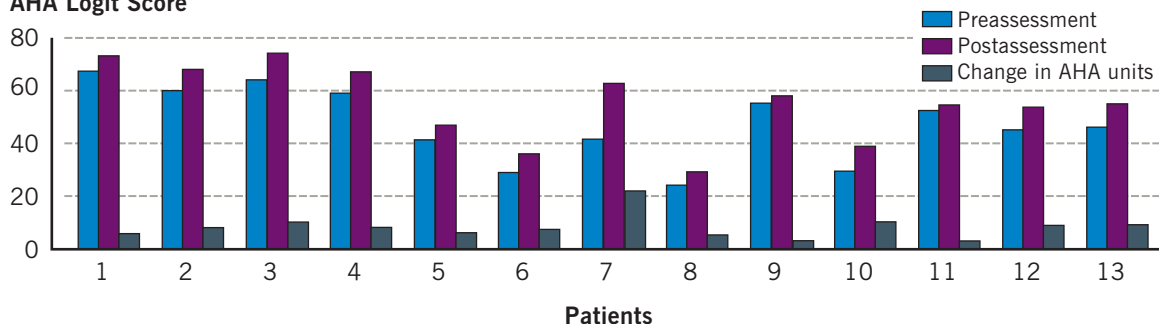
Constraint-induced movement therapy (CIMT) is an innovative, scientifically supported method of upper extremity rehabilitation for children with neuromotor impairments and is often used to treat children with hemiplegia. CIMT involves constraint/casting of the nonaffected upper extremity in combination with intensive therapy. Therapy consists of 3 weeks of intensive outpatient occupational therapy services for 5 days per week, 3 hours per day.

Pre- and postassessments include the Assisting Hand Assessment (AHA). The AHA measures how effectively children with unilateral hand dysfunction use their involved hand collaboratively with their well-functioning hand to perform bimanual tasks. The logit-based 0–100 AHA-unit scale was used to obtain this data. Treatment courses and outcomes for these patients is summarized below in logit-based AHA units.

Change in AHA Logits (N = 13)

2016

AHA Logit Score



AHA = Assisting Hand Assessment

Data indicate gains for patients in 2016, with a mean increase in logit-based AHA units of 8. An increase in 4 AHA logits is considered to be clinically significant ($P = 0.046$).¹ All 13 patients demonstrated an increase in their logit scores, and 10 of the 13 participants demonstrated a clinically significant change.

Reference:

1. Holmefur M, Aarts P, Hoare B, Krumlinde-Sundholm L. Test-retest and alternate forms reliability of the Assisting Hand Assessment. *J Rehabil Med*. 2009; 41: 886-891.

Constraint-Induced Movement Therapy Summer Camp

Therapy Services, Cleveland, offers a Constraint-Induced Movement Therapy (CIMT) summer camp, offering group treatment based on the CIMT principles. Patients enrolled in the summer camp included those with cerebral palsy, pediatric stroke, and traumatic brain injury who had previously received individual CIMT treatment. Four children were enrolled in each of the 2015 and 2016 CIMT summer camps (a total of 8 children were evaluated). The camp took place 5 days per week for 2 weeks. Therapy sessions were 3 hours in length, for a total of 30 hours. Children's unaffected limbs were casted at the start of the program and the casts remained in place for the duration of the program.

In 2015 (children 1 through 4), pre- and postmeasures were completed for all children, which included the box and blocks test, grip strength, active range of motion for shoulder flexion, and quadruped weight bearing.

In 2016 (children 5 through 8), pre- and postmeasures were completed for all children, which included Assisting Hand Assessment (AHA), the box and blocks test, grip strength, active range of motion for shoulder flexion, and quadruped weight bearing. The box and blocks test was used to assess how many blocks the children could move in 1 minute, 1 at a time, from 1 side of a partitioned box to the other side using their affected limb. Grip strength was measured in pounds of pressure using a dynamometer. Active range of motion was measured in degrees of movement using a goniometer. Quadruped weight bearing was measured in minutes. The graphs at right summarize the outcomes for the CIMT summer camp.

2764 *new evaluations were completed across all Therapy Services sites in 2016*

6 — *Number of Therapy Services locations across northeast Ohio, with 184 staff members running 22 specialty programs*

4 — *Number of published research studies, with 2 prospective multi-institute studies in process*

Constraint-Induced Movement Therapy Summer Camp Outcomes (N = 8)

2015 – 2016

	Phase	Box and Blocks (number of blocks moved into box)	Grip Strength (PSI)	Shoulder Flexion (active ROM in degrees)	Quadruped Weight Bearing (number of seconds)	AHA (2016 only)
Child 1	Pre	14	6	160	20	
	Post	19	6.3	180	180	
Child 2	Pre	22	7	180	40	
	Post	28	7.7	180	180	
Child 3	Pre	34	10.5	180	20	
	Post	35	13	180	120	
Child 4	Pre	0	0	125	20	
	Post	6	2.5	145	120	
Child 5	Pre	33	2	165	66	59
	Post	33	4.5	170	120	69
Child 6	Pre	27	1.5	180	90	66
	Post	28	14	180	120	75
Child 7	Pre	22	5	147	27	60
	Post	24	7	150	120	67
Child 8	Pre	35	11	180	17	78
	Post	36	16	180	120	85
Mean Gain		2.75 blocks in 1 minute	2.18 PSI	6 degrees ROM	86 seconds	8.25 logits (2016)

PSI = pounds per square inch, ROM = range of motion

An increase in 4 AHA logits is considered to be clinically significant ($P = 0.046$),¹ and the average increase in logit score for this program was 8.25 logits

Pediatric Therapy Services

Model Me

Therapy Services, Westlake, offers a social skills group based on the Model Me Kids® video-modeling program and Social Thinking®.

Model Me Kids produces video-modeling DVDs, software, and apps to support social skills training for children with autism, Asperger syndrome, pervasive developmental disorder not otherwise specified, nonverbal learning disorder, and other developmental delays. Model Me Kids videos demonstrate social skills by modeling peer behavior at school, on a play date, at a birthday party, on the playground, at a library, in a restaurant, and more. Real children model and narrate each skill. Goals of the approach include helping children learn to relate to others, work effectively as part of a team, and learn effectively as part of a group. Social Thinking is a language-based approach best utilized by people with solid language and intelligence, aged 4 through adulthood.

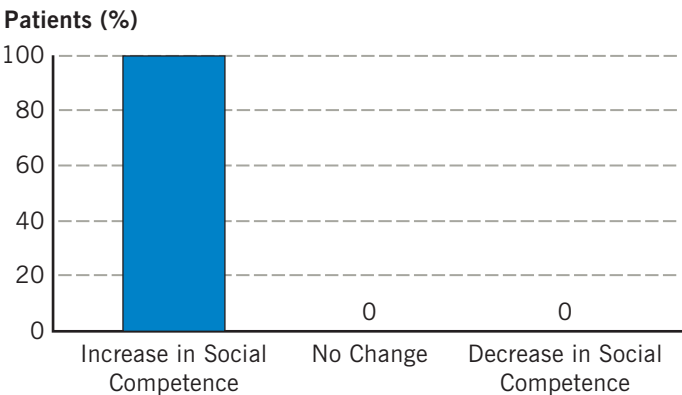
This social skills group takes place over 12 weeks. Specific skills are taught and addressed based on the age and need of each child. The group was run a total of 3 times in 2016. Pre- and postassessments were obtained using the Home & Community Social Behavior Scales (HCSBS). The HCSBS is a 64-item behavior rating scale designed for use in evaluating social competence and antisocial behavior in children and youth aged 5–18. HCSBS is a norm-referenced, standardized assessment developed for use by parents and other home-based raters.

The HCSBS includes two major scales consisting of 32 items each: Social Competence (Scale A) and Antisocial Behavior (Scale B). The Social Competence Scale includes items that describe positive social skills and traits that are characteristic of well-adjusted and socially skilled children and youth. The Antisocial Behavior Scale includes items that describe various socially related problem behaviors that may impede socialization, be destructive or harmful to others, and produce negative social outcomes.

This instrument was used to monitor and measure behavioral change and responsiveness during the course of the group. All the participants demonstrated an improvement in social competence. Seventy-one percent of participants demonstrated a decrease in antisocial behavior, 1 participant did not demonstrate any change, and 1 participant demonstrated an increase in antisocial behavior.

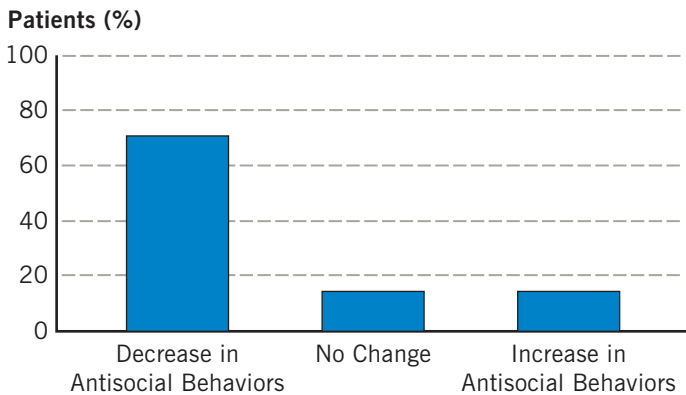
Social Competence (N = 9)

2016



Antisocial Behavior (N = 9)

2016



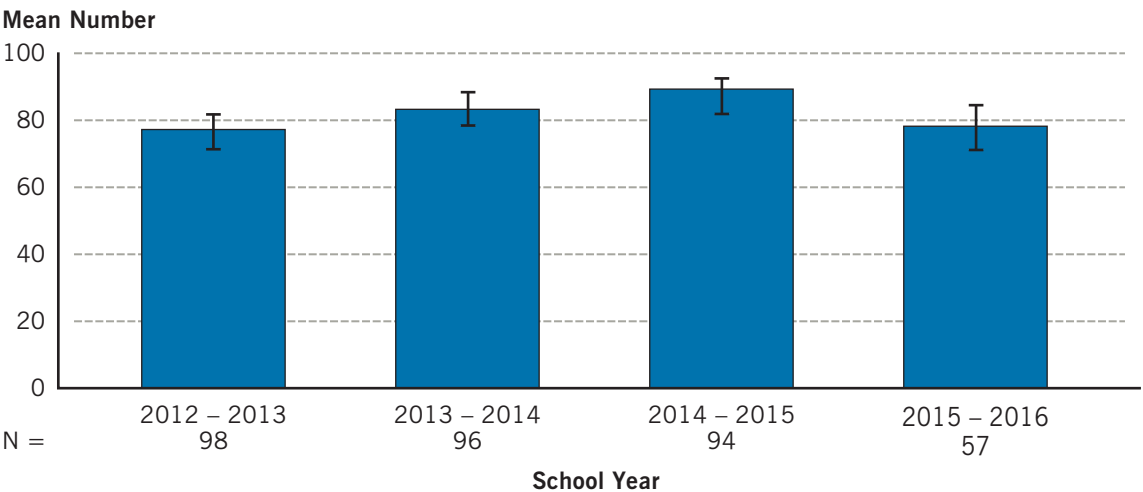
Cleveland Clinic Children’s Hospital for Rehabilitation

Lerner School for Autism — Educational Goal Achievement

Students attending the Lerner School at Cleveland Clinic’s Center for Autism receive an Individualized Education Plan (IEP) each year. This plan typically consists of 60–120 educational objectives to be addressed by each student during the school year. In the 2015–2016 school year, students achieved an average of 78 IEP goals, representing 85% of their total goals. This high level of achievement occurred despite the challenging behavior of many students that inhibits learning.

Number of Educational Goals Achieved by Students Attending the Lerner School for Autism (N = 345)

2012 – 2016



Lerner School for Autism — Preschool Placement Outcomes

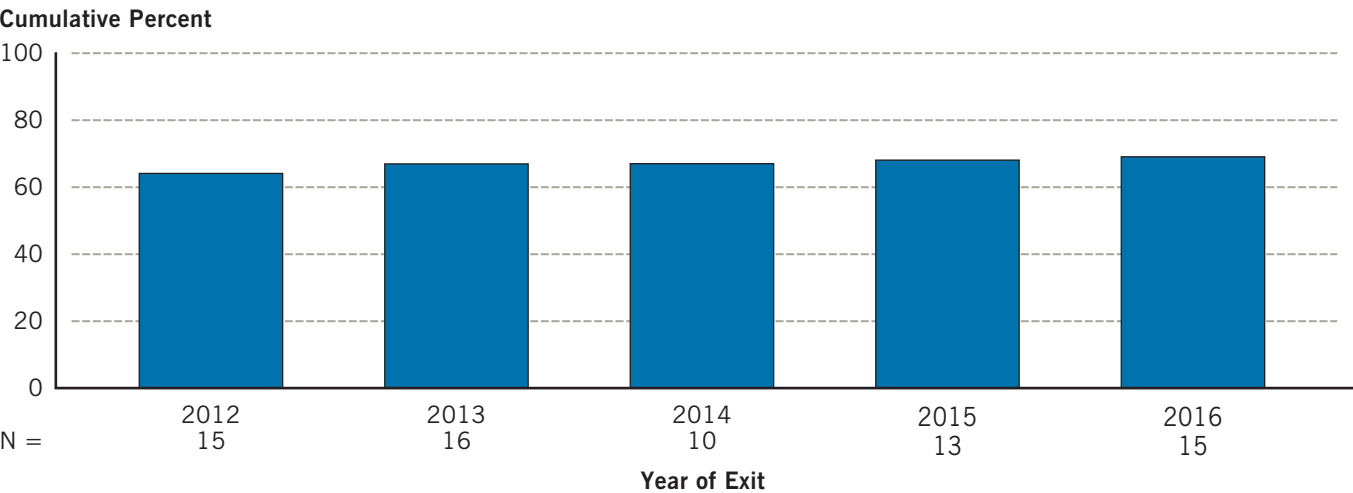
The preschool program provides year-round, early, intensive behavior intervention for young children who are diagnosed with autism spectrum disorder. Children as young as 18 months through 6 years receive 30 or more hours per week of intervention. Using applied behavior analysis and child development principles, the staff works with parents to develop an individualized curriculum to teach communication, social interaction, play, and a range of functional and adaptive skills.

Since the preschool opened in 2002, 159 students have graduated from the program. Most children who have exited the preschool program in the past decade have been placed either in mainstream educational settings with minimal or no supports, or in intensive special education placements that do not require intensive behavioral intervention or 1:1 aide services. Previous studies of intensive behavioral intervention programs for preschoolers found rates of less intensive support placements of approximately 30% to 50%. These outcomes indicate that young children with autism who attend the Lerner preschool program experience substantial improvements in their ability to function independently in their future educational placements, resulting in decreased resource use and cost to the public education system.

Over the past 5 years the number of preschoolers who have exited to placements where intensive behavioral intervention is no longer required for student success has remained stable.

Improvement in Preschool Outcomes During the Past 5 Years (N = 69)

2012 – 2016

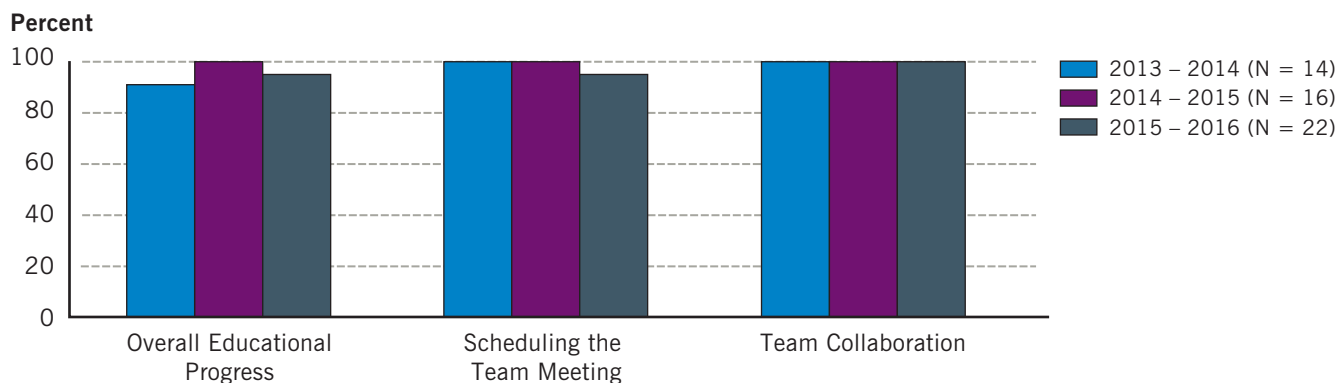


Lerner School for Autism — Parent Satisfaction With Educational Planning

Each year the educational team and parents of Lerner School children meet to set individual goals for the next school year. The aim of this collaborative meeting is to determine next steps for the child to achieve maximal educational progress. Each team member is expected to contribute his or her expertise. Parent perspectives are key to this process. After the team meeting, parents are asked about their level of satisfaction with the process. Since 2013, Lerner School parents have reported high levels of satisfaction with educational progress, scheduling the team meeting, and team collaboration.

Percentage of Parents Satisfied or Very Satisfied With Educational Planning

2013 – 2014



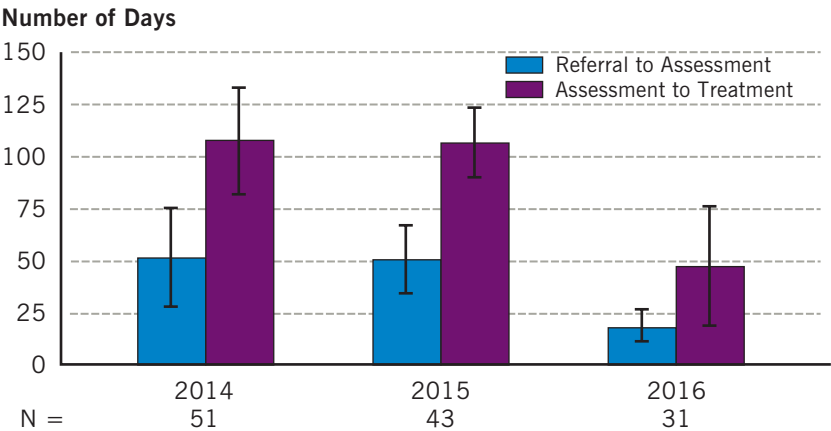
Lerner School for Autism — Functional Behavioral Assessments

Challenging behaviors, such as aggression, self-injury, and property destruction, are common in children with autism spectrum disorder and greatly inhibit their ability to participate in education. Understanding what children are attempting to achieve by engaging in challenging behavior (behavioral functions) is important to initiating the appropriate treatment.

Understanding exactly what behavioral functions are feeding the challenging behavior requires the expertise of a certified behavior analyst conducting a comprehensive assessment process that includes parent interviews, child observation, teacher questionnaires, and many other procedures. This process can be time-consuming, further delaying the child’s access to a meaningful education. During the past 3 years, the Lerner School streamlined several procedures for referral of a child with challenging behavior and enhanced the assessment methods used. As a result, the time from referral to initiation of a functional behavioral assessment and from assessment to initiation of the appropriate treatment has been greatly reduced.

Time From Behavior Problem Referral to Comprehensive Functional Assessment and From Assessment to Initiation of Treatment

2014 – 2016

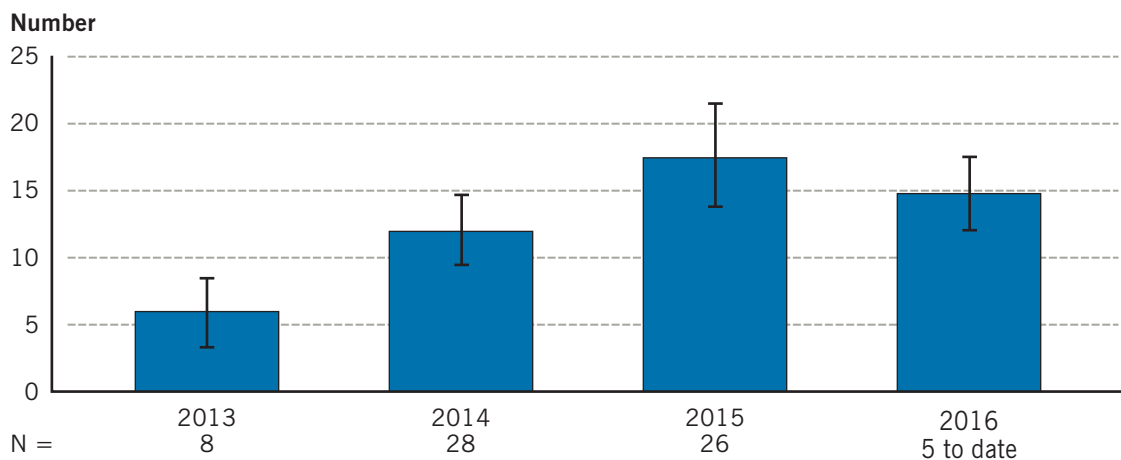


Outpatient Applied Behavioral Analysis–Based Speech Language Therapy

The Center for Autism offers applied behavioral analysis (ABA)–based speech language therapy to children with autism. Typical therapy includes one 60-minute session per week, although actual therapy frequencies and duration vary based on the needs of the child. During the session, treatment focuses on improving receptive and expressive language and also targets social (pragmatic) language skills important for communicating at home, at school, and in other community settings. Before therapy begins, a baseline assessment is conducted to identify the most crucial and appropriate treatment objectives. Examples of treatment objectives include responding to social questions, identifying increasingly difficult objects or actions, and approximating word sounds. Each patient typically has between 8 and 20 objectives that are the focus of treatment, and although progress is highly variable, it is expected that patients will achieve 50% or more of their objectives. Progress is tracked using the number of treatment objectives mastered by the child.

Number of Therapy Objectives Achieved by Children Attending Outpatient Speech/Language Therapy

2013 – 2016

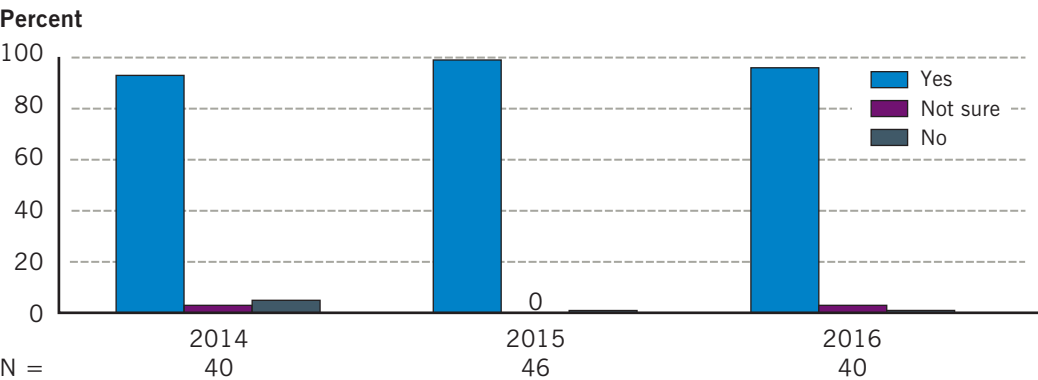


Summer Treatment Program for Children and Adolescents with ADHD

Cleveland Clinic Children’s offers the Summer Treatment Program (STP), the Summer Treatment Program for Adolescents (STPA), and the Summer Treatment Program for Young Adults (STPYA). These programs are designed for children, youth, and young adults with attention-deficit/hyperactivity disorder (ADHD) who are ages 6–10, 11–13, and 14–18 years. The 7-week program is an intensive behavioral intervention that improves specific target behaviors associated with ADHD. In 2016, 38 students participated in STP, 21 students participated in STPA, and 3 students participated in STPYA. The following graphs depict results from the parent satisfaction and behavioral improvement ratings from the STP, STPA, and STPYA.

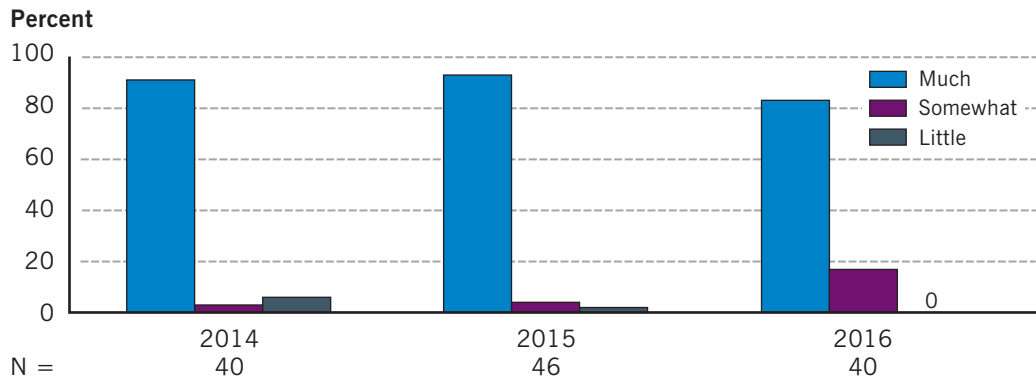
Parents’ Responses to: Would You Recommend or Resend Your Child to the Summer Treatment Program? (N = 126)

2014 – 2016



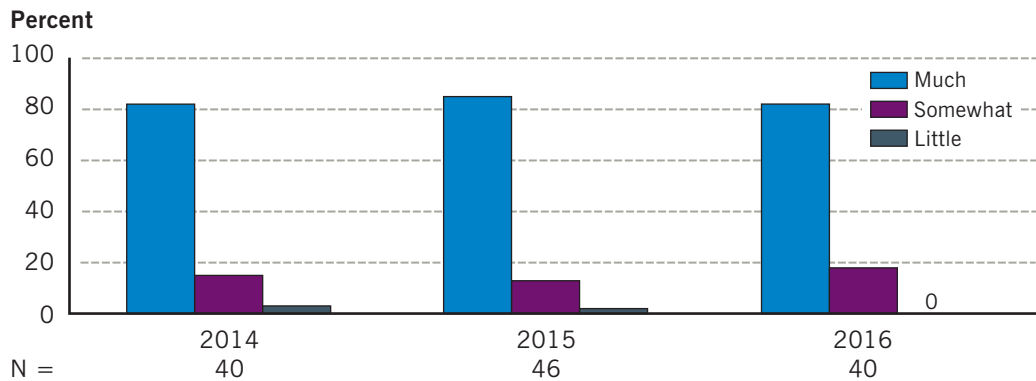
Extent to Which Child and Parent Benefited From Summer Treatment Program (N = 126)

2014 – 2016



Overall Behavioral Improvement of Children After Completion of the Summer Treatment Program (N = 126)

2014 – 2016

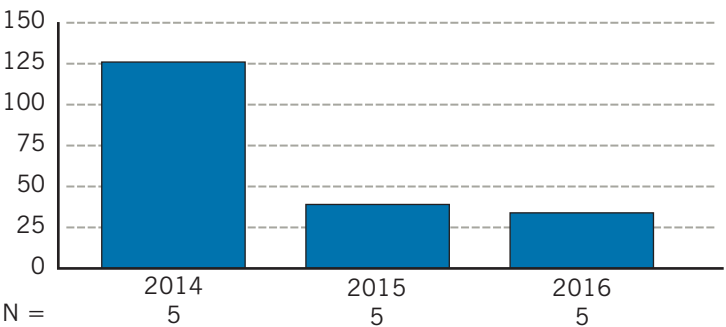


Cleveland Clinic Children’s Hospital for Rehabilitation

Improvement in Average Daily Negative Behaviors of Multiyear Returners to Summer Treatment Program (N = 5)

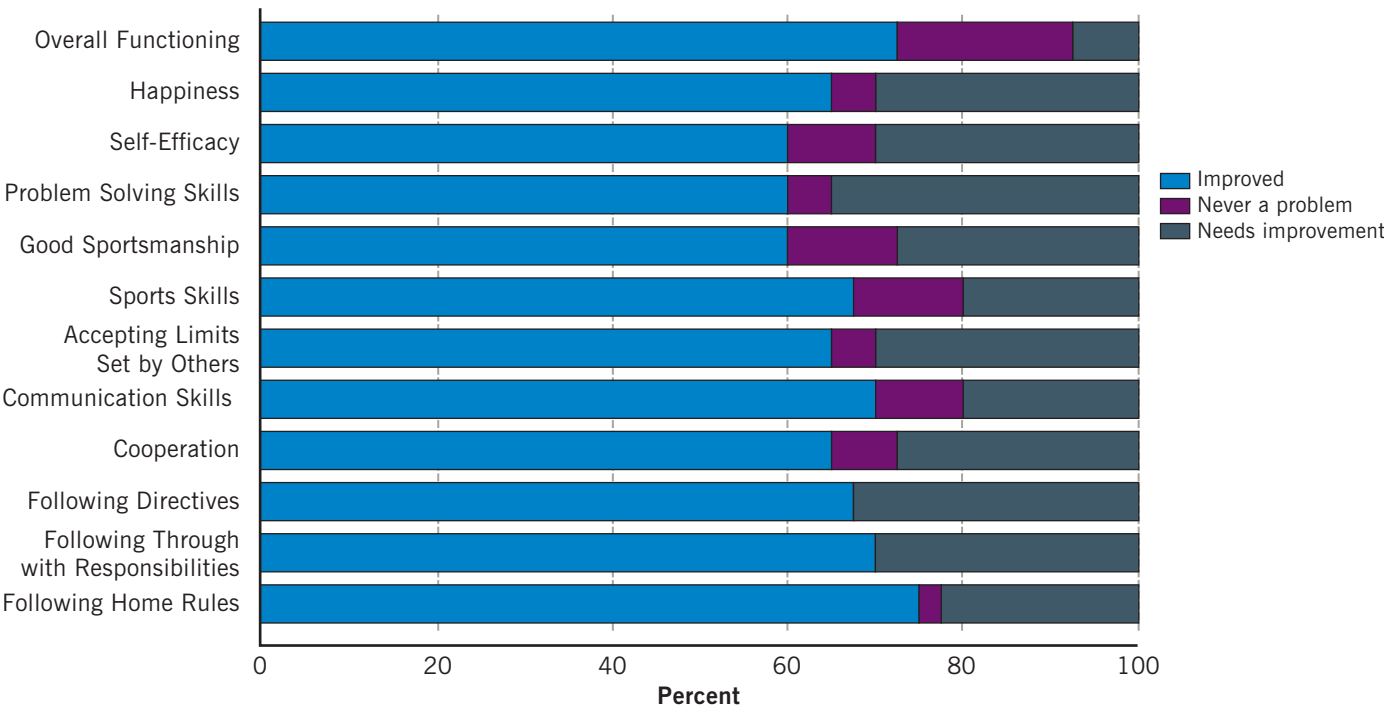
2014 – 2016

Negative Behaviors (Average)



Overall Skill Improvement After Completion of the Summer Treatment Program (N = 40)

2016

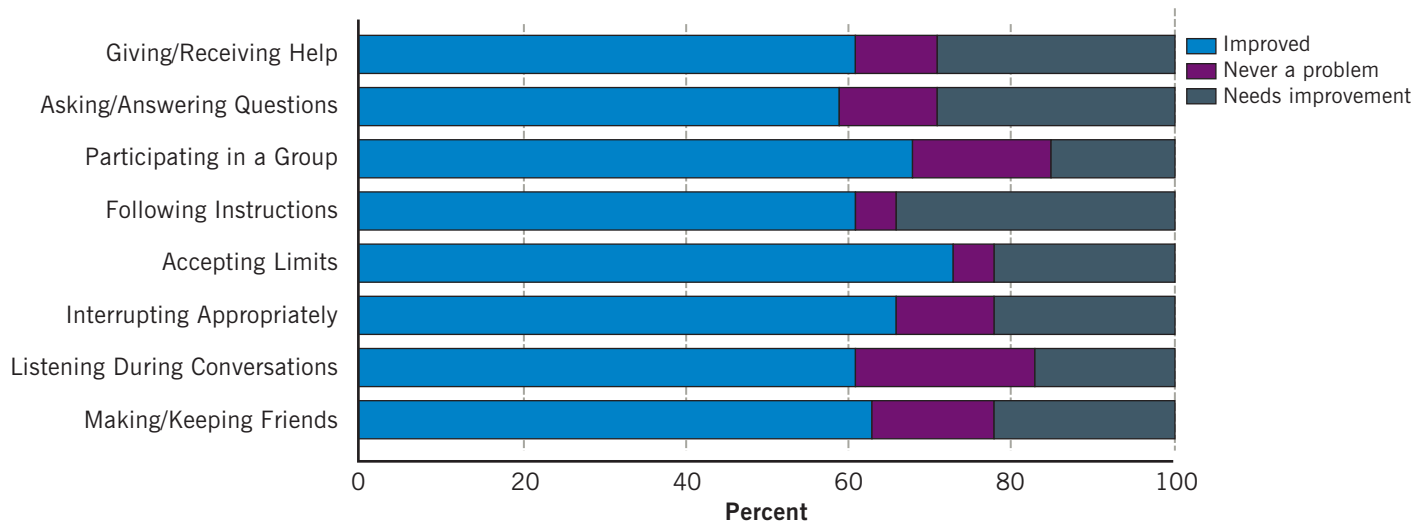


Social Skills Training for Children With ADHD

Cleveland Clinic Children's Hospital for Rehabilitation offers age-appropriate social skills training for children and adolescents with attention-deficit/hyperactivity disorder (ADHD) aged 6–14 years. Groups meet 90 minutes per week for 7 weeks, and sessions are facilitated by the ADHD Center for Evaluation and Treatment staff. Behavioral techniques and interventions are simultaneously taught to caregiver and parents. The most frequently targeted skills are following instructions, accepting limits, interrupting appropriately, listening during conversation, and making and keeping friends. During the 2016 social skills training, 100% of parents stated that they would recommend the program to others.

Skill Improvement Ratings for Children With ADHD Ages 6 – 14 Years (N = 41)

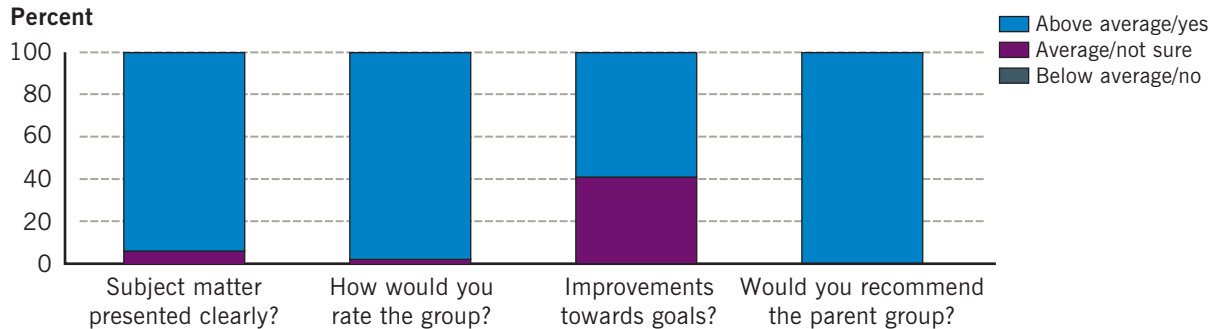
2016



Cleveland Clinic Children's Hospital for Rehabilitation

Parent Group Ratings (N = 47)

2016



A medication monitoring clinic teaches participants the effect of medications on symptoms of ADHD, the presence or absence of side effects, and the optimal dose.

Behavioral Gastroenterology Program

The Behavioral Gastroenterology Program is a joint initiative between the departments of Pediatric Gastroenterology and Pediatric Behavioral Health to provide comprehensive medical and psychological care to patients with complex needs. Children and adolescents generally present with abdominal pain or other functional gastrointestinal (GI) disorders (44%), toileting and constipation difficulties (38%), or challenges coping with a chronic GI disease (18%). Treatment goals and interventions vary based on the presenting concerns of each individual child, but often will target:

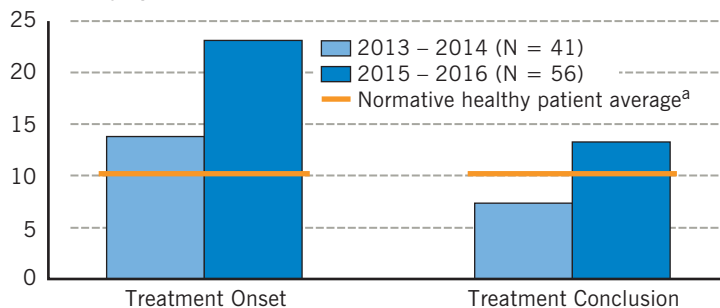
- Decreased somatic symptoms
- Improved physical and psychosocial functioning
- Decreased depression symptoms
- Decreased anxiety symptoms

Somatic complaints were assessed using the Children's Somatization Inventory (CSI-24), a self-report measure of the subjective intensity of the child's somatic symptoms, at the onset and conclusion of treatment. Higher scores reflect increased frequency and intensity of overall somatic complaints. Patients reported an average 37.04% decrease in somatic symptoms in 2015–2016.

Average Reduction in Somatic Symptoms (N = 97)

2013 – 2016

Somatic Symptom Score (CSI-24)



CSI = Children's Somatization Inventory

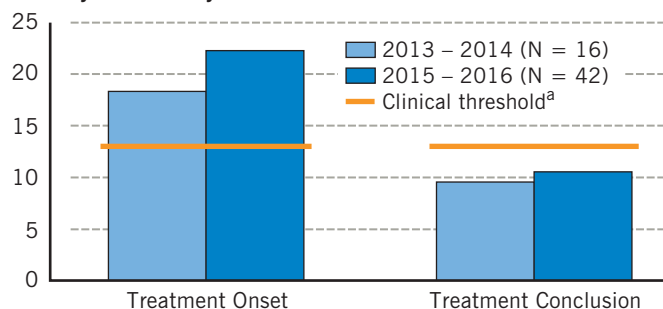
^aMeesters C, Muris P, Ghys A, Reumerman T, Rooijmans M. The Children's Somatization Inventory: further evidence for its reliability and validity in a pediatric and a community sample of Dutch children and adolescents. *J Pediatr Psychol*. 2003;28(6):413-422.

The Functional Disability Inventory measures the degree to which children experience difficulty in physical and psychosocial functioning due to their physical health status, with higher scores reflecting more significant disability. Patients who began treatment with significantly elevated levels of functional disability reported by parent-proxy an average 50.6% improvement in physical and psychosocial functioning at the end of treatment in 2015–2016.

Average Reduction in Functional Disability (N = 58)

2013 – 2016

Severity of Disability (FDI Score)

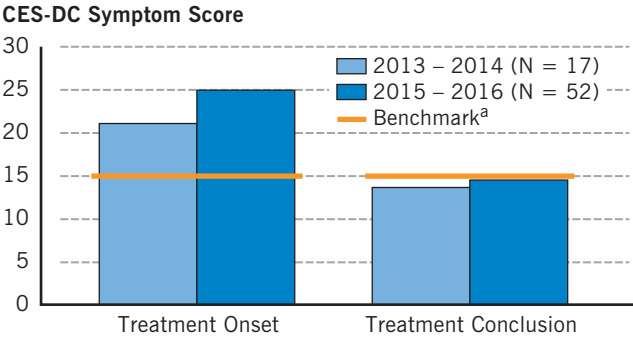


FDI = Functional Disability Inventory

^aKashikar-Zuck S, Flowers SR, Claar RL, Guite JW, Logan DE, Lynch-Jordan AM, Palermo TM, Wilson AC. Clinical utility and validity of the Functional Disability Inventory among a multicenter sample of youth with chronic pain. *Pain*. 2011 Jul;152(7):1600-1607.

Depression symptoms were evaluated by the Center for Epidemiological Studies-Depression Scale for Children, a self-report measure, with higher scores indicating more depression symptoms. Adolescents who began treatment with significantly elevated levels of depression symptoms reported an average 38.75% improvement in symptoms at the end of treatment in 2015–2016.

Average Reduction in Depression Symptoms (N = 69)
2013 – 2016

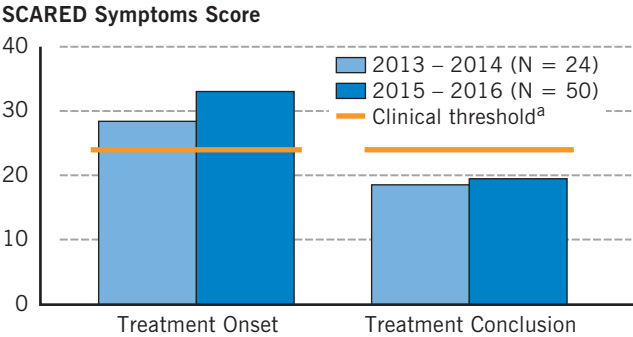


CES-DC = Center for Epidemiological Studies Depression Scale for Children

^aWeissman MM, Orvaschel H, Padian N. Children's symptom and social functioning self-report scales. Comparison of mothers' and children's reports. *J Nerv Ment Dis.* 1980 Dec;168(12):736-740.

Anxiety symptoms were evaluated by the Screen for Child Anxiety Related Emotional Disorders, a self-report measure, with higher scores representing increased symptoms of anxiety. Adolescents who began treatment with significantly elevated levels of anxiety symptoms reported an average 41.26% improvement in symptoms at the end of treatment in 2015–2016.

Average Reduction in Anxiety Symptoms (N = 74)
2013 – 2016



SCARED = Screen for Childhood Anxiety Related Emotional Disorders

^aBirmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baucher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *J Am Acad Child Adolesc.* 1999 Oct;38(10):1230-1236.

Cleveland Clinic Children’s Hospital for Rehabilitation

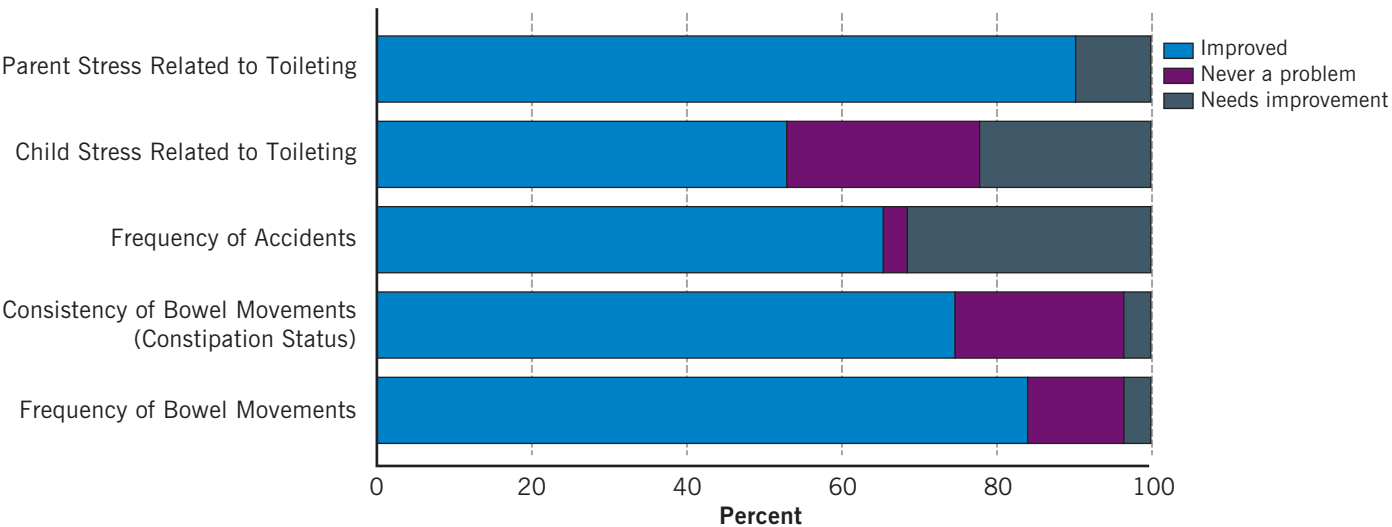
Toileting Clinic Shared Medical Appointment

The Toileting Clinic Shared Medical Appointment is an interdisciplinary group treatment model for pediatric encopresis and functional constipation. Practitioners from the departments of Pediatric Behavioral Health, Pediatric Gastroenterology, and Child Life cooperate in treating children and their parents.

The purpose of the Toileting Clinic is to address the medical, emotional and behavioral factors that affect children’s toileting difficulties. The clinic consists of 4 weekly appointments, plus follow-up appointments as needed. Parents and children are seen in separate groups to tailor the information provided. The treatment model was initiated after identification of a need to improve patient access and parent support for this condition and has demonstrated preliminary success.

Improvement in Bowel Movement Regimen (N = 32)

2016



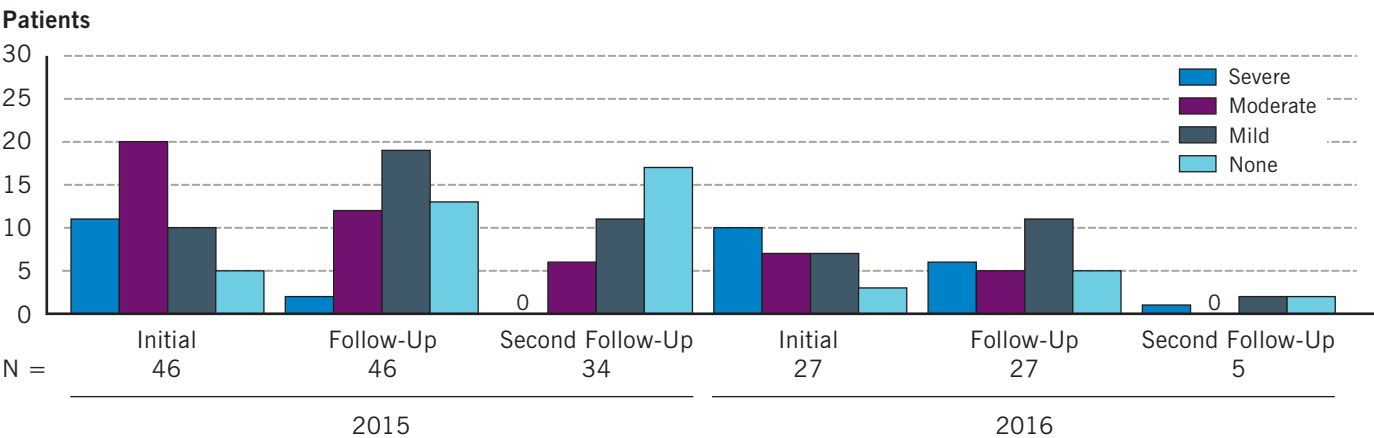
Pediatric Feeding Program

Data were collected on all patients treated in the Pediatric Feeding Disorders Program for 2015 and 2016. To be included in the treatment group, patients must have completed 15 sessions of treatment, with a break of no more than 6 weeks between sessions.

All patients received treatment from an interdisciplinary team that included practitioners from psychology, occupational therapy, speech therapy, and nutrition. The data collected focused on the general outpatient treatment group. Data were measured at the initiation of treatment and at two follow-up intervals of 15 sessions and 30 sessions and/or discharge (whichever came first).

Change in Oral Skill Deficit

2015 – 2016

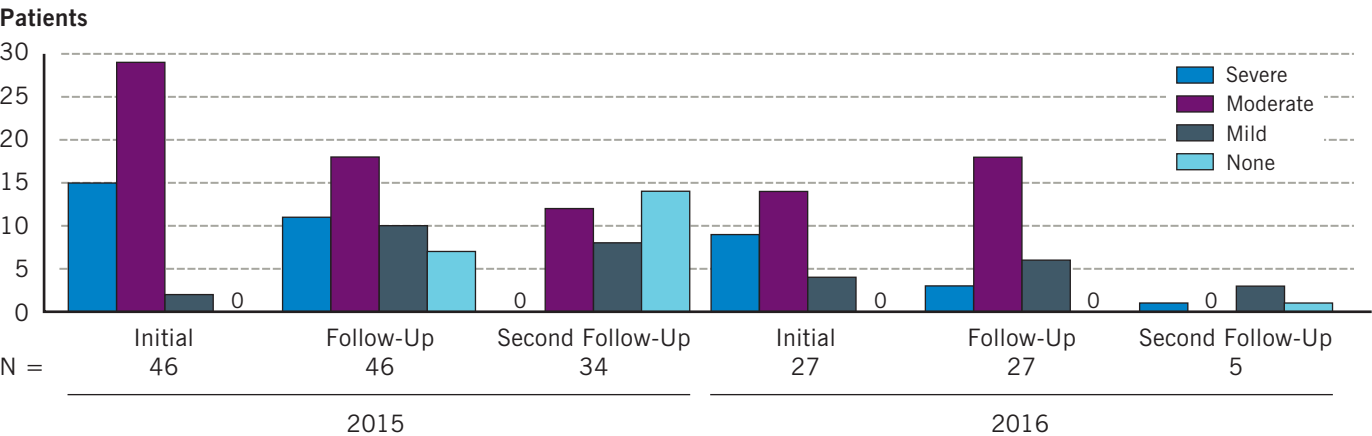


Oral motor and oral sensory deficits measured include gagging, spillage or expulsion of foods from oral cavity during meals, pocketing foods in cheek or under tongue, and the inability to chew/manage age appropriate textures. A substantial decrease in the severity of oral skill deficit is observed from the initial presentation to follow-up treatment. The 2016 second follow-up is limited in size secondary to delayed initiation of treatment, extended break in treatment, withdrawal from treatment, and/or progress resulting in fewer treatment sessions.

Cleveland Clinic Children’s Hospital for Rehabilitation

Change in Resistant Feeding Behaviors

2015 – 2016



Resistant feeding behaviors measured include aggression, intentional gagging and vomiting, tantrums, and spoon batting. A substantial decrease in the severity of resistant feeding behavior is observed from the initial presentation to follow-up treatment. The 2016 second follow-up is limited in size secondary to delayed initiation of treatment, extended break in treatment, withdrawal from treatment, and/or progress resulting in fewer treatment sessions.

Pediatric Pain Rehabilitation

The Pediatric Pain Rehabilitation Program at Cleveland Clinic Children's Hospital for Rehabilitation is an innovative program designed for children and adolescents with chronic pain that interferes with normal activities. Because of their pain, these children do not attend school, interact with peers, or participate in normal activities. The program focuses on helping children manage their pain and on restoring daily activity. Patients typically spend 2 weeks as inpatients, followed by a third week of hospital day care. Both inpatients and day patients receive pediatric subspecialty care, behavioral health, and rehabilitation therapies in an individualized, coordinated manner. The program was a recipient of the 2015 American Pain Society Clinical Centers of Excellence in Pain Management award and is the first pediatric-specialty, interdisciplinary pain rehabilitation program accredited by the Commission on the Accreditation of Rehabilitation Facilities.

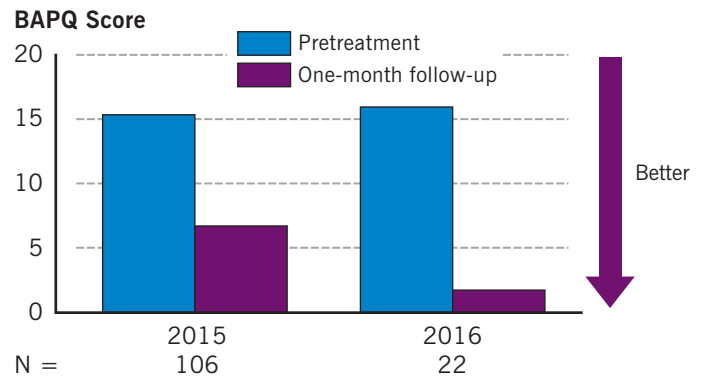
In 2016, a total of 119 patients were seen, 61% of whom were from out of state. In 2015, 106 patients were seen.

In July 2016, the Pediatric Pain Rehabilitation Program transitioned to a new patient registry, including outcome measures that were not reported in past Outcomes books. This year's report presents data on the first 25 patients and includes admission and 1-month follow-up data from the old registry. Complete data using the new measures will be reported in next year's Outcomes book.

The Bath Adolescent Pain Questionnaire (BAPQ) 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 and at 1 month after its completion. The physical functioning, social functioning, and pain-specific anxiety subscales are used in outcome analyses. For all metrics, patients showed improvement in the average score 1 month following completion of the program.

Physical Functioning

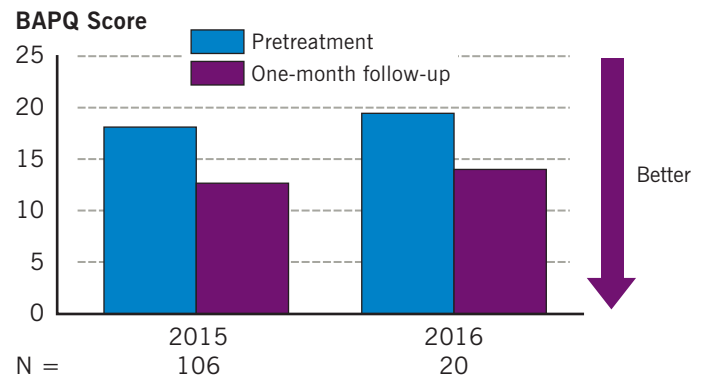
2015 – 2016



In 2016, patients reported an average 89% improvement in physical functioning, based on the BAPQ. Data from 2015 revealed an average 56% improvement.

Social Functioning (BAPQ)

2015 – 2016



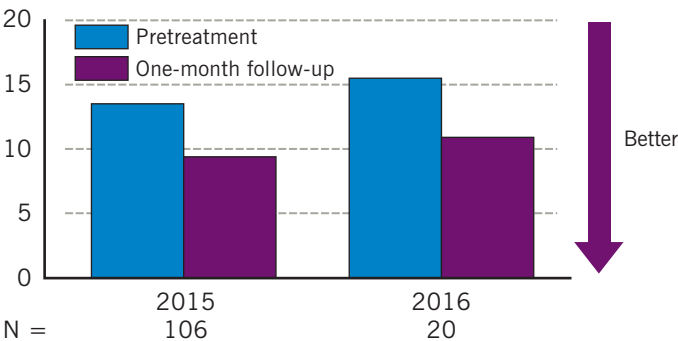
In 2016, patients reported an average 28% improvement in social functioning, based on the BAPQ. Data from 2015 revealed an average 30% improvement.

Cleveland Clinic Children’s Hospital for Rehabilitation

Pain-Specific Anxiety

2015 – 2016

BAPQ Score



BAPQ = Bath Adolescent Pain Questionnaire

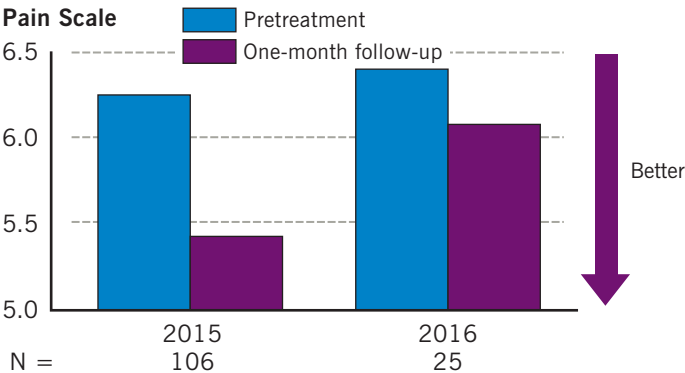
In 2016, patients reported an average 29% improvement in pain-specific anxiety, based on the BAPQ. Data from 2015 revealed an average 30% decrease.

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 3-week pain rehabilitation program and at 1-month follow-up.

Pain Severity

2015 – 2016

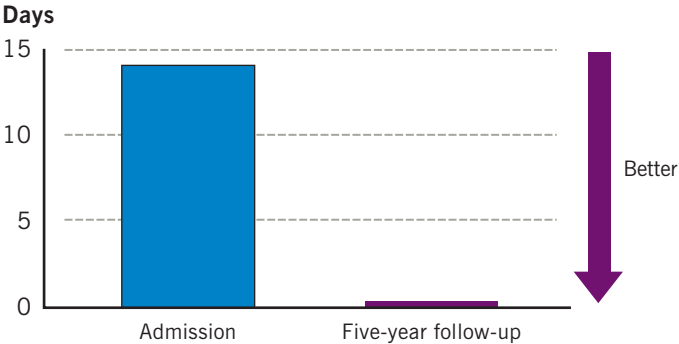
Pain Scale



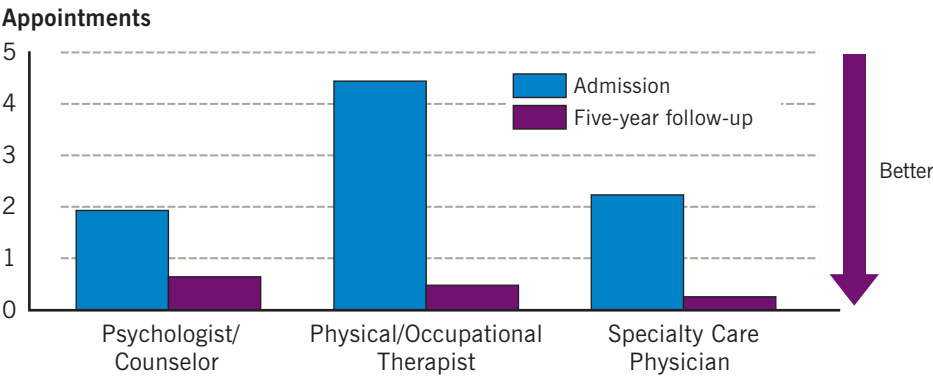
One-month follow-up assessment for 2016 revealed an average 5% decrease in pain severity, compared with a 13% decrease in 2015.

In 2016, the Pediatric Pain Rehabilitation Program conducted a follow-up of patients 5 years postdischarge. Out of 192 patients, 119 were contacted, and 57 patients (48%) completed a telephone follow-up survey.

School or Work Days Missed in Past Month at 5-Year Follow-Up (N = 57)

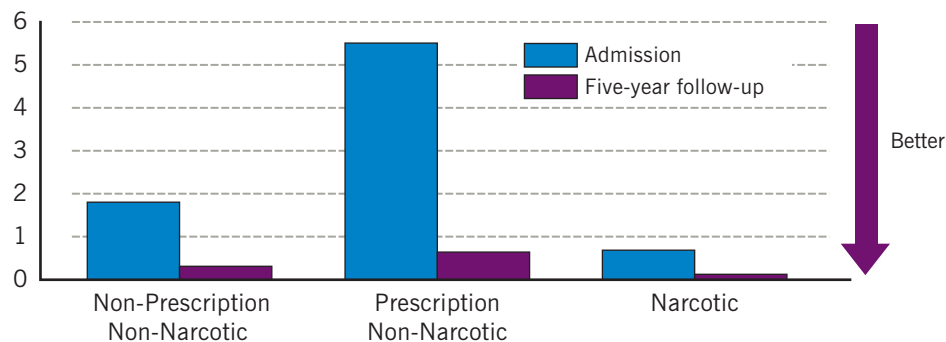


Scheduled Appointments in Past 30 Days at 5-Year Follow-Up (N = 57)



Medication Usage in Past 48 Months at 5-Year Follow-Up (N = 57)

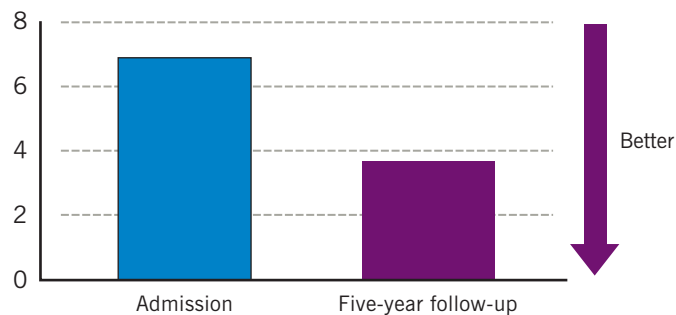
Number of Medications



Significant reductions in school and/or work days missed, healthcare utilization, and medication usage were reported.

Pain Severity 5-Year Follow-Up (N = 57)

Pain Scale



On a scale of 0 (no pain) to 10 (maximum pain), a substantial decline in pain from admission to 5-year follow-up was reported.

Pediatric Inpatient Rehabilitation Program — WeeFIM Outcomes

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

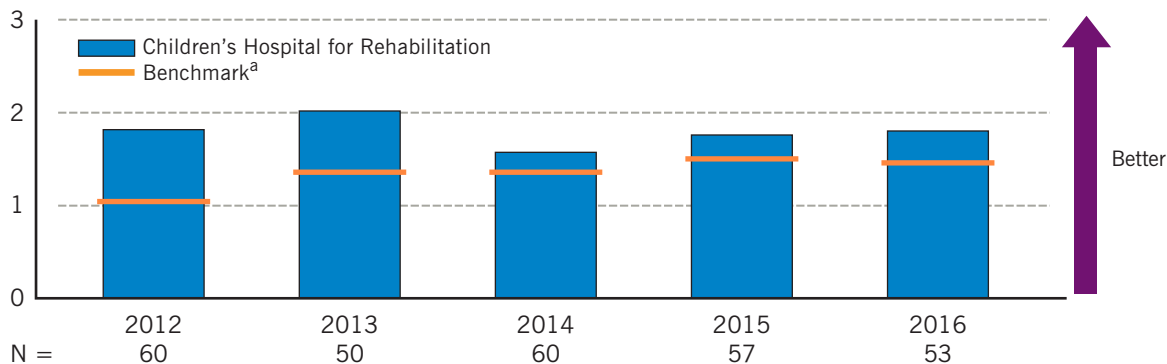
The WeeFIM national database provides reports comparing individual programs against national benchmarks. The outcomes of children treated at Cleveland Clinic Children's Hospital for Rehabilitation compare favorably with the national benchmarks.

The WeeFIM length-of-stay efficiency score is the most important measure of the effectiveness of a rehabilitation program because it indicates how quickly a program is able to improve a child's functional abilities.^a The Children's Hospital for Rehabilitation's score has been consistently above the national benchmark.

Children's Hospital for Rehabilitation WeeFIM Length-of-Stay Efficiency Score (N = 280)

2012 – 2016

LOS Efficiency Score



LOS = length of stay

^aThe national benchmark is calculated from a database of WeeFIM performance measures of like facilities housed by the Uniform Data System for Medical Rehabilitation. udsmr.org

Patient Experience — Pediatric Institute & Cleveland Clinic Children's

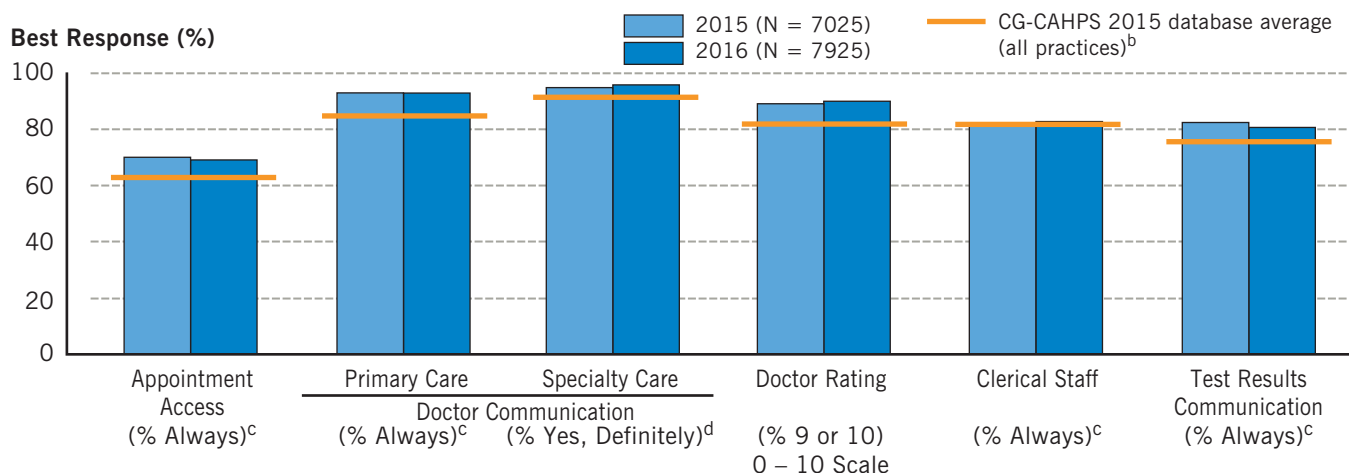
Keeping patients at the center of all that Cleveland Clinic does is critical. Patients First is the guiding principle at Cleveland Clinic. Patients First is safe care, high-quality care, in the context of patient satisfaction, and high value. Ultimately, caregivers have the power to impact every touch point of a patient's journey, including their clinical, physical, and emotional experience.

Cleveland Clinic recognizes that patient experience goes well beyond patient satisfaction surveys. Nonetheless, sharing the survey results with caregivers and the public affords opportunities to improve how Cleveland Clinic delivers exceptional care.

Outpatient Office Visit Survey — Pediatric Institute & Cleveland Clinic Children's

CG-CAHPS Assessment^a

2015 – 2016



^aIn 2013, Cleveland Clinic began administering the Clinician and Group Practice Consumer Assessment of Healthcare Providers and Systems surveys (CG-CAHPS), standardized instruments developed by the Agency for Healthcare Research and Quality (AHRQ) and supported by the Centers for Medicare & Medicaid Services for use in the physician office setting to measure patients' perspectives of outpatient care.

^bBased on results submitted to the AHRQ CG-CAHPS database from 2829 practices in 2015

^cResponse options: Always, Usually, Sometimes, Never

^dResponse options: Yes, definitely; Yes, somewhat; No

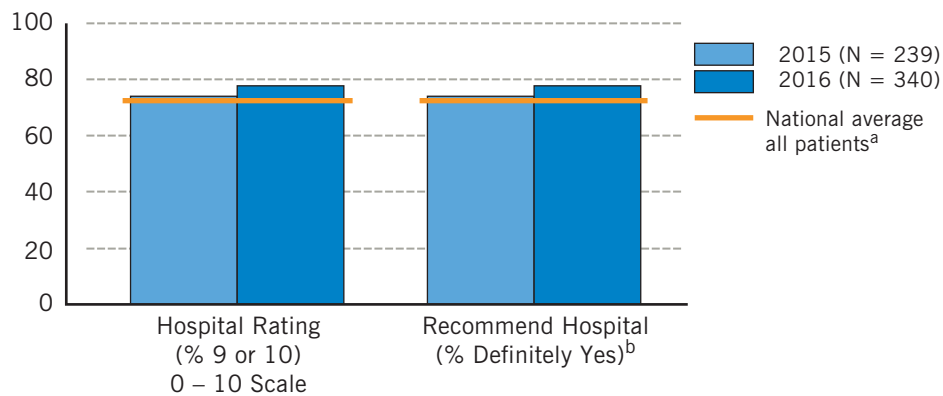
Source: Press Ganey, a national hospital survey vendor

Inpatient Survey — Pediatric Institute & Cleveland Clinic Children's

Inpatient Survey Overall Assessment

2015 – 2016

Best Response (%)



^aBased on national survey results of discharged patients, January 2015 – December 2015, from 4172 US hospitals. [medicare.gov/hospitalcompare](https://www.medicare.gov/hospitalcompare)

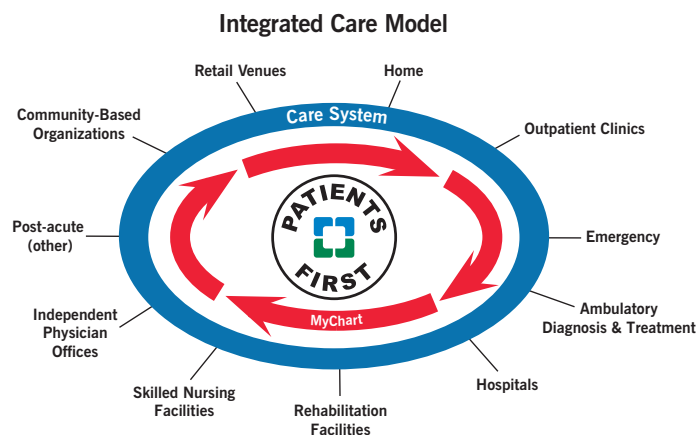
^bResponse options: Definitely yes, Probably yes, Probably no, Definitely no

Cleveland Clinic — Implementing Value-Based Care

Focus on Value

Cleveland Clinic has developed and implemented new models of care that focus on “Patients First” and aim to deliver on the Institute of Medicine goal of **Safe, Timely, Effective, Efficient, Equitable, Patient-centered** care. Creating new models of Value-Based Care is a strategic priority for Cleveland Clinic. As care delivery shifts from fee-for-service to a population health and bundled payment delivery system, Cleveland Clinic is focused on concurrently improving patient safety, outcomes, and experience.

What does this new model of care look like?



The Cleveland Clinic Integrated Care Model (CCICM) is a value-based model of care, designed to improve outcomes while reducing cost. It is designed to deliver value in both population health and specialty care.

- The patient remains at the heart of the CCICM.
- The blue band represents the care system, which is a seamless pathway that patients move along as they receive care in different settings. The care system represents integration of care across the continuum.
- Critical competencies are required to build this new care system. Cleveland Clinic is creating disease- and condition-specific care paths for a variety of procedures and chronic diseases. Another facet is implementing comprehensive care coordination for high-risk patients to prevent unnecessary hospitalizations and emergency department visits. Efforts include managing transitions in care, optimizing access and flow for patients through the CCICM, and developing novel tactics to engage patients and caregivers in this work.
- Measuring performance around quality, safety, utilization, cost, appropriateness of care, and patient and caregiver experience is an essential component of this work.

Therapy Services Innovations:

Pediatric Gait Analysis Lab

The Pediatric Gait Analysis Lab uses 3-dimensional motion-capture technology and analytic software to provide information on the effects of orthotics and therapeutic interventions for children with gait abnormalities due to neurologic or orthopaedic conditions.

Observation alone is insufficient to analyze gait. The new technology allows analysis of multiple joints and planes of motion at one time, giving physical therapists at the lab a detailed understanding of the impact of factors such as spasticity and body segment misalignment on gait.

Physical therapists evaluate each child and consult with caregivers to provide appropriate recommendations with the goal of maximizing independence and participation in daily activities.

Patient Experience Innovations:

Using Family Engagement to Drive Excellence in Patient Experience

Working closely with the family engagement committee, Cleveland Clinic Children's has developed a plan to enhance physician communication, with a goal of sustained 90th percentile performance, as measured by Press-Ganey surveys. The plan is based on monthly communiqués from many sources, including emails, videos, and other forms of communication collected from patients' families and covering such topics as managing expectations, listening, and empathy. The whiteboard in patients' rooms has been redesigned with both a physician section and a family section. The family section includes contact information, questions of the day, a fun fact about the patient, and other important information. A 5-question service recovery survey is administered on the second day of hospitalization, with questions designed by patients' parents. These data collection methods allow the staff to quickly rectify problems and gauge areas of opportunity.



Contact Information

Cleveland Clinic Children's Appointments

216.444.KIDS (5437)
800.223.CARE (2273),
extension 45437 (4KIDS)

Cleveland Clinic Children's Referrals

855.733.3712

On the Web at
clevelandclinicchildrens.org

Staff Listing

For a complete listing of Cleveland Clinic Children's staff, please visit clevelandclinic.org/staff.

Publications

Cleveland Clinic Pediatric Institute & Children's staff authored **74** publications in 2016 as indexed within Web of Science.

Locations

For a complete listing of Cleveland Clinic Children's locations, please visit clevelandclinicchildrens.org.





Additional Contact Information

General Patient Referral

24/7 hospital transfers or physician consults

800.553.5056

General Information

216.444.2200

Hospital Patient Information

216.444.2000

General Patient Appointments

216.444.2273 or 800.223.2273

Referring Physician Center and Hotline

855.REFER.123 (855.733.3712)

Or email refdr@ccf.org or visit clevelandclinic.org/refer123

Request for Medical Records

216.444.2640 or
800.223.2273, ext. 42640

Same-Day Appointments

216.444.CARE (2273)

Global Patient Services/ International Center

Complimentary assistance for international patients and families

001.216.444.8184 or visit
clevelandclinic.org/gps

Medical Concierge

Complimentary assistance for out-of-state patients and families

800.223.2273, ext. 55580, or
email medicalconcierge@ccf.org

Cleveland Clinic Abu Dhabi

clevelandclinicabudhabi.ae

Cleveland Clinic Canada

888.507.6885

Cleveland Clinic Florida

866.293.7866

Cleveland Clinic Nevada

702.483.6000

For address corrections or changes,
please call

800.890.2467

About Cleveland Clinic

Overview

Cleveland Clinic is an academic medical center offering patient care services supported by research and education in a nonprofit group practice setting. More than 3500 Cleveland Clinic staff physicians and scientists in 140 medical specialties and subspecialties care for more than 7.1 million patients across the system annually, performing nearly 208,000 surgeries and conducting more than 652,000 emergency department visits. Patients come to Cleveland Clinic from all 50 states and 185 nations. Cleveland Clinic's CMS case-mix index is the second-highest in the nation.

Cleveland Clinic is an integrated healthcare delivery system with local, national, and international reach. The main campus in midtown Cleveland, Ohio, has a 1400-bed hospital, outpatient clinic, specialty institutes, labs, classrooms, and research facilities in 44 buildings on 167 acres. Cleveland Clinic has more than 150 northern Ohio outpatient locations, including 10 regional hospitals, 18 full-service family health centers, 3 health and wellness centers, an affiliate hospital, and a rehabilitation hospital for children. Cleveland Clinic also includes Cleveland Clinic Florida; Cleveland Clinic Nevada; Cleveland Clinic Canada; Cleveland Clinic Abu Dhabi, UAE; Sheikh Khalifa Medical City (management contract), UAE; and Cleveland Clinic London (opening in 2020). Cleveland Clinic is the largest employer in Ohio, with more than 51,000 employees. It generates \$12.6 billion of economic activity a year.

Cleveland Clinic supports physician education, training, consulting, and patient services around the world through representatives in the Dominican Republic, Guatemala, India, Panama, Peru, Saudi Arabia, and the United Arab Emirates. Dedicated Global Patient Services offices are located at Cleveland Clinic's main campus, Cleveland Clinic Abu Dhabi, Cleveland Clinic Canada, and Cleveland Clinic Florida.

The Cleveland Clinic Model

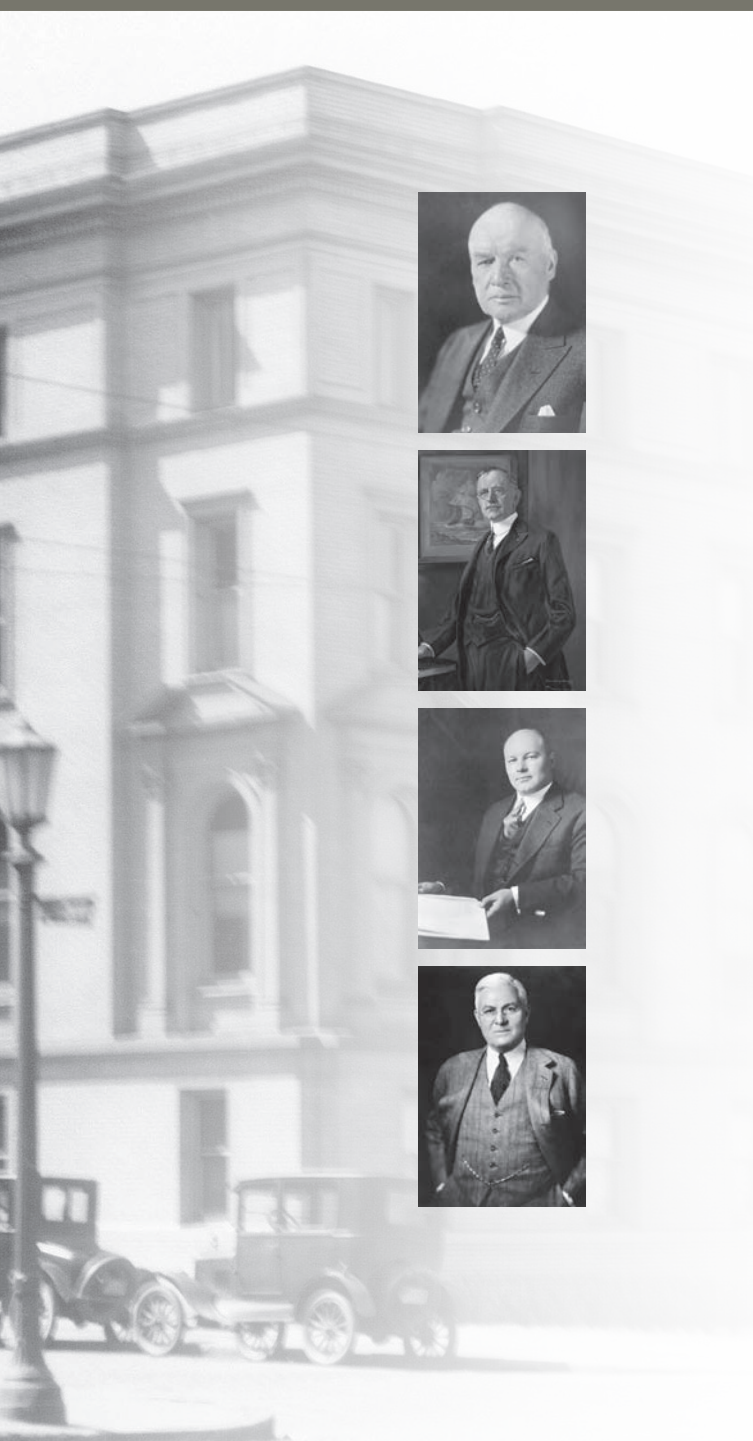
Cleveland Clinic was founded in 1921 by 4 physicians who had served in World War I and hoped to replicate the organizational efficiency of military medicine. The organization has grown through the years by adhering to the nonprofit, multispecialty group practice they established. All Cleveland Clinic 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.

Cleveland Clinic Florida was established in 1987. Cleveland Clinic began opening family health centers in surrounding communities in the 1990s. Marymount Hospital joined Cleveland Clinic in 1995, followed by regional hospitals including Euclid Hospital, Fairview Hospital, Hillcrest Hospital, Lutheran Hospital, Medina Hospital, South Pointe Hospital, and affiliate Ashtabula County Medical Center. In 2015, the Akron General Health System joined the Cleveland Clinic health system.

Internally, Cleveland Clinic services are organized into patient-centered integrated practice units called institutes, each institute combining medical and surgical care for a specific disease or body system. Cleveland Clinic was among the first academic medical centers to establish an Office of Patient Experience, to promote comfort, courtesy, and empathy across all patient care services.

A Clinically Integrated Network

Cleveland Clinic is committed to providing value-based care, and it has grown the Cleveland Clinic Quality Alliance into the nation's second-largest, and northeast Ohio's largest, clinically integrated network. The network comprises more than 6300 physician members, including both Cleveland Clinic staff and independent physicians from the community. Led by its physician members, the Quality Alliance strives to improve quality and consistency of care; reduce costs and increase efficiency; and provide access to expertise, data, and experience.



Cleveland Clinic Lerner College of Medicine

Lerner College of Medicine is known for its small class sizes, unique curriculum, and full-tuition scholarships for all students. Each new class accepts 32 students who are preparing to be physician investigators. In 2015, Cleveland Clinic broke ground on a 477,000-square-foot multidisciplinary Health Education Campus. The campus, which will open in July 2019, will serve as the new home of the Case Western Reserve University (CWRU) School of Medicine and Cleveland Clinic's Lerner College of Medicine, as well as the CWRU School of Dental Medicine, the Frances Payne Bolton School of Nursing, and physician assistant and allied health training programs.

Graduate Medical Education

In 2016, nearly 2000 residents and fellows trained at Cleveland Clinic and Cleveland Clinic Florida in our continually growing programs.

U.S. News & World Report Ranking

Cleveland Clinic is ranked the No. 2 hospital in America by *U.S. News & World Report* (2016). It has ranked No. 1 in heart care and heart surgery since 1995. In 2016, 3 of its programs were ranked No. 2 in the nation: gastroenterology and GI surgery, nephrology, and urology. Ranked among the nation's top five were gynecology, orthopaedics, rheumatology, pulmonology, and diabetes and endocrinology.

Cleveland Clinic Physician Ratings

Cleveland Clinic believes in transparency and in the positive influence of the physician-patient relationship on healthcare outcomes. To continue to meet the highest standards of patient satisfaction, Cleveland Clinic physician ratings, based on nationally recognized Press Ganey patient satisfaction surveys, are published online at clevelandclinic.org/staff.

Referring Physician Center and Hotline

Call us 24/7 for access to medical services or to schedule patient appointments at 855.REFER.123 (855.733.3712), email refdr@ccf.org, or go to clevelandclinic.org/Refer123. The free Cleveland Clinic Physician Referral App, available for mobile devices, gives you 1-click access. Available in the App Store or Google Play.

Remote Consults

Anybody anywhere can get an online second opinion from a Cleveland Clinic specialist through our MyConsult service. For more information, go to clevelandclinic.org/myconsult, email myconsult@ccf.org, or call 800.223.2273, ext. 43223.

Request Medical Records

216.444.2640 or 800.223.2273, ext. 42640

Track Your Patients' Care Online

Cleveland Clinic offers an array of secure online services that allow referring physicians to monitor their patients' treatment while under Cleveland Clinic care and gives them access to test results, medications, and treatment plans. my.clevelandclinic.org/online-services

DrConnect (online access to patients' treatment progress while under referred care): call 877.224.7367, email drconnect@ccf.org, or visit clevelandclinic.org/drconnect.

MyPractice Community (affordable electronic medical records system for physicians in private practice): 216.448.4617.

eRadiology (teleradiology consultation provided nationwide by board-certified radiologists with specialty training, within 24 hours or stat): call 216.986.2915 or email starimaging@ccf.org.

Medical Records Online

Patients can view portions of their medical record, receive diagnostic images and test results, make appointments, and renew prescriptions through **MyChart**, a secure online portal. All new Cleveland Clinic patients are automatically registered for **MyChart**. clevelandclinic.org/mychart

Access

Cleveland Clinic is committed to convenient access, offering virtual visits, shared medical appointments, and walk-in urgent care for your patients. clevelandclinic.org/access

Critical Care Transport Worldwide

Cleveland Clinic's fleet of ground and air transport vehicles is ready to transfer patients at any level of acuity anywhere on Earth. Specially trained crews provide Cleveland Clinic care protocols from first contact. To arrange a transfer for STEMI (ST-elevation myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage), or aortic syndrome, call 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 the largest CME program in the country. Live courses are offered in Cleveland and cities around the nation and the world. The center's website (ccfcme.org) is an educational resource for healthcare providers and the public. It has a calendar of upcoming courses, online programs on topics in 30 areas, and the award-winning virtual textbook of medicine, The Disease Management Project.

Clinical Trials

Cleveland Clinic is running more than 2200 clinical trials at any given time for conditions including breast and liver cancer, coronary artery disease, heart failure, epilepsy, Parkinson disease, chronic obstructive pulmonary disease, asthma, high blood pressure, diabetes, depression, and eating disorders. Cancer Clinical Trials is a mobile app that provides information on the more than 200 active clinical trials available to cancer patients at Cleveland Clinic. clevelandclinic.org/cancertrialapp

Healthcare Executive Education

Cleveland Clinic has programs to share its expertise in operating a successful major medical center. The Executive Visitors' Program is an intensive, 3-day behind-the-scenes view of the Cleveland Clinic organization for the busy executive. The Samson Global Leadership Academy is a 2-week immersion in challenges of leadership, management, and innovation taught by Cleveland Clinic leaders, administrators, and clinicians. Curriculum includes coaching and a personalized 3-year leadership development plan. clevelandclinic.org/executiveeducation

Consult QD Physician Blog

A website from Cleveland Clinic for physicians and healthcare professionals. Discover the latest research insights, innovations, treatment trends, and more for all specialties. consultqd.clevelandclinic.org

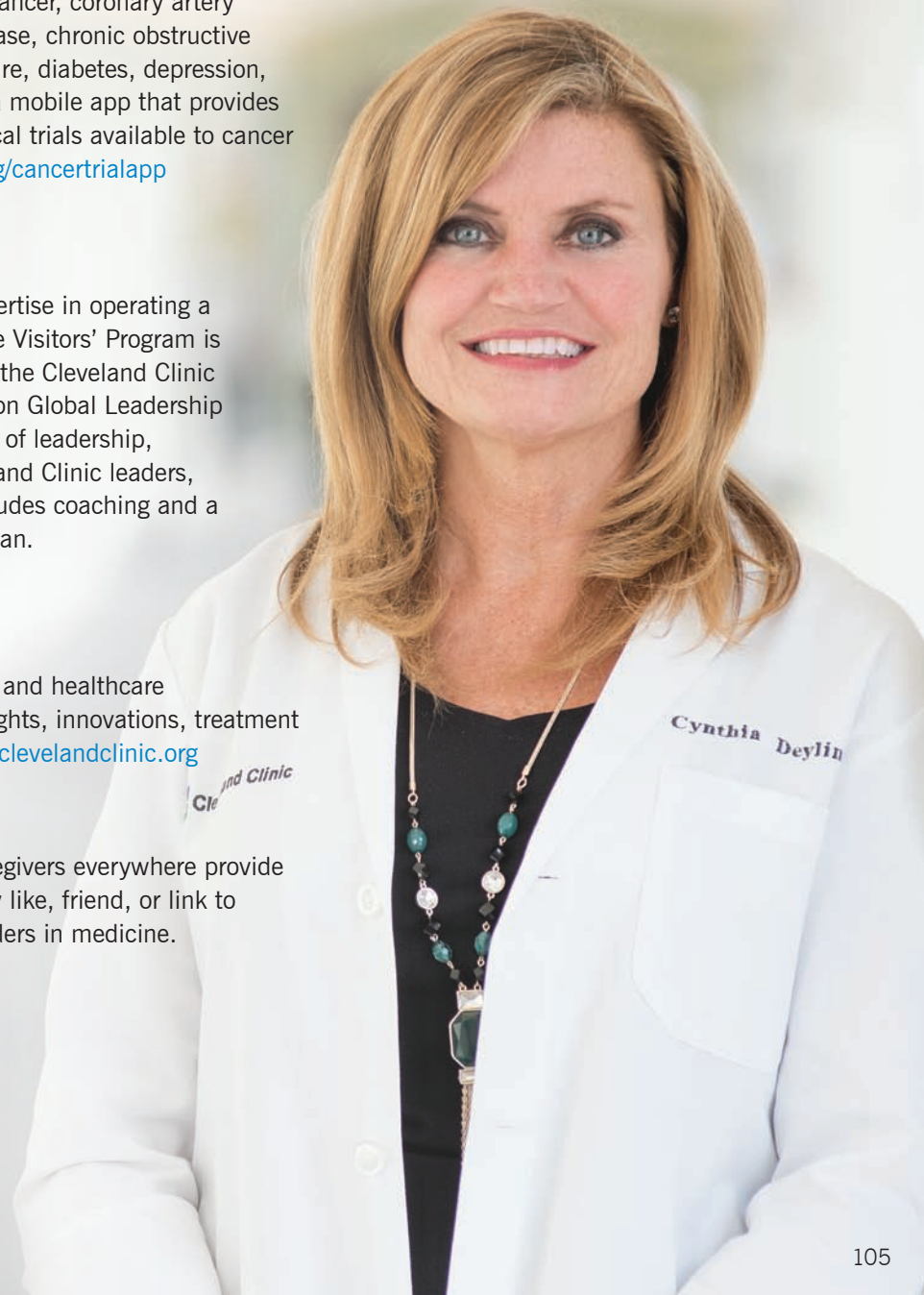
Social Media

Cleveland Clinic uses social media to help caregivers everywhere provide better patient care. Millions of people currently like, friend, or link to Cleveland Clinic social media — including leaders in medicine.

Facebook for Medical Professionals
facebook.com/CMEclevelandclinic

Follow us on Twitter
[@cleclinicMD](https://twitter.com/cleclinicMD)

Connect with us on LinkedIn
clevelandclinic.org/MDlinkedin





This project would not have been possible without the commitment and expertise of a team led by Dr. Vera Hupertz, Anne Shi, and Allan Cohn.

Graphic design and photography were provided by Cleveland Clinic's Center for Medical Art and Photography.



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