

your guide to ACL reconstruction



contents

■	introduction	--
■	ACL and ACL injuries	
	ACL defined	--
	common signs and symptoms of an ACL injury	--
	diagnosing an ACL injury	--
	treating an ACL injury	--
■	our team	
	physicians	--
	physical therapists	--
	physical therapy assistants	--
■	success stories	
	Kareem Khasawneh	--
	Kelsey Faris	--
■	pain control and prehabilitation before surgery	
	pain control	--
	knee immobilizer and crutches	--
	prehabilitation	--
■	surgery	
	before your child's surgery	--
	what should I do the day before surgery	--
	what to bring with you the day of surgery	--
	ACL reconstruction	--
■	after surgery	
	pain control	--
	bracing and ambulation (walking)	--
	bathing	--
	diet	--
	activity	--
	physical therapy	--
	KOOS survey	--
	weekly rehab protocol and bracing expectations	--
	returning to sports	--
■	sports medicine	
	sports medicine	--
	Sportsmetrics™	--
■	frequently asked questions	--
■	common words and definitions	--

introduction to Dayton Children's Hospital

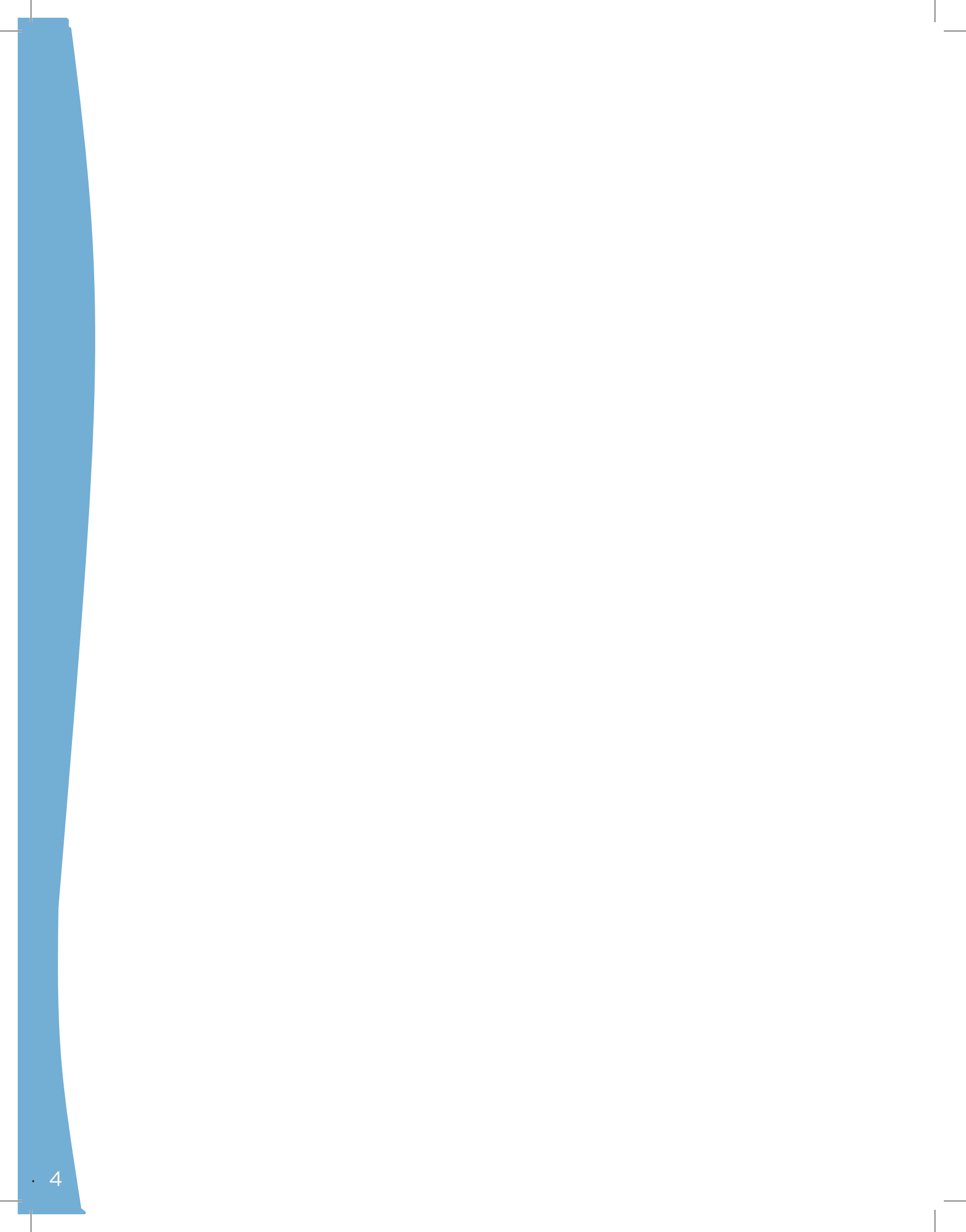
Thank you for choosing Dayton Children's Hospital for your child's ACL (anterior cruciate ligament) surgery! We look forward to taking care of your child.

This binder will help prepare you and your child for what to expect before and after ACL surgery. We'll discuss what an ACL injury is, what happens during surgery, caring for the injury after surgery, and we'll answer the questions we get asked the most.

Throughout the binder you'll notice that certain terms are **bolded**. These are frequently used words in the book, and throughout your ACL repair journey at Dayton Children's.

For simplicity, we will use "your child" to refer to the patient throughout this binder. We know that many of our patients are able to understand and follow these instructions on their own. Using one reference term, rather than "you/your child" throughout will make the document easier to read.

While this binder should answer many of your questions, you can always ask anyone on your surgical and rehabilitation teams. We are all here to help you and your child.



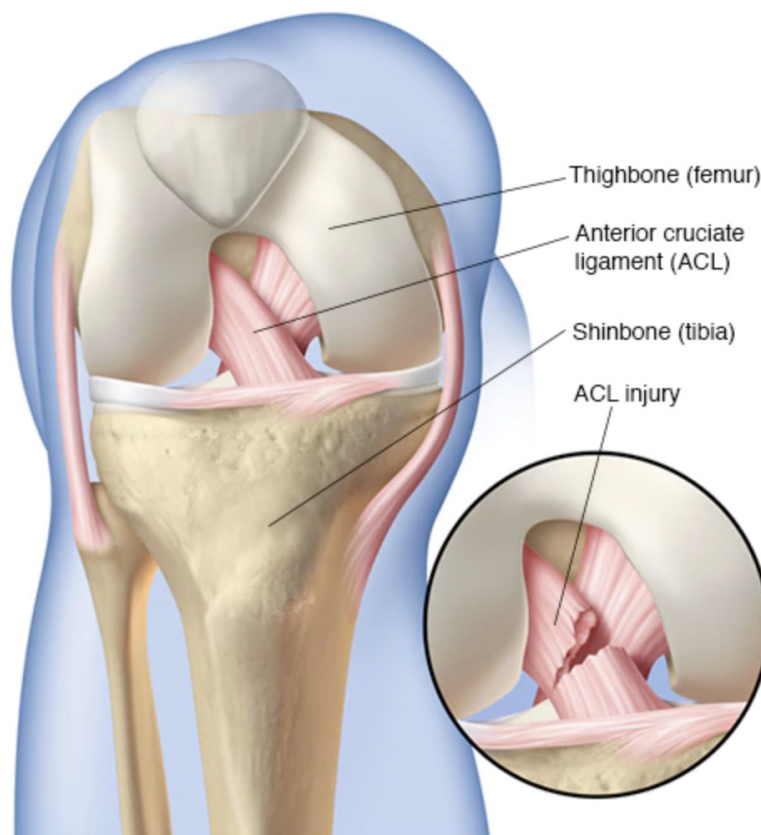
ACL and ACL injuries

ACL

The anterior cruciate ligament (**ACL**) is a thick band of tissue that is made up of lots of fibers, like a rope. It is one of four **ligaments** that connect the upper leg bone (**femur**) to the lower leg bone (**tibia**). It is one of the major stabilizers of the knee.

ACL injury

The ACL can be stretched or torn by forcing the knee beyond normal motion. This often happens when changing direction rapidly, slowing down from running or landing a jump.



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Photo credit of Mayo Foundation for Medical Education and Research

About 200,000 ACL injuries occur every year in the United States. Adolescents, females and athletes in pivoting/cutting sports like soccer or basketball tend to have more ACL injuries.

common signs and symptoms of an ACL injury

Patients may feel a sudden “pop” with pain deep in the knee. There is usually significant swelling in the knee that develops within a few hours of injury. Patients may have limited knee motion due to pain and swelling. The knee may feel unstable, buckle or “give out.”

diagnosing an ACL injury

Your provider will check the knee for stability, movement and tenderness. They will compare the injured knee to the uninjured knee.

X-rays will be done to look for damage to the knee bones. More testing may be done too if your child’s provider thinks they have an ACL tear or other damage to **cartilage**, the **meniscus** or ligaments. One example is an MRI. An MRI shows damage to ligaments, tendons, muscles and cartilage. Other injuries may be found if a scope is placed in the knee during surgery.

treating an ACL injury

When the ACL is torn it does not heal on its own, and the knee becomes unstable. Without the ACL controlling knee movement, the knee bones are more likely to rub against each other with activity. This leads to injuries of the tissue that covers the ends of the bones (cartilage), and can trap and tear the pads that cushion the knee joint (meniscus).

The radiologist and orthopaedic surgeon will carefully review the images from the tests to see the extent of the injury. Then, the surgeon will discuss with you and your child the best treatment option based on age, lifestyle and future goals. This could include surgery.

If the ACL is partially torn, sometimes these can be repaired or rehabilitated. However, 90 percent of ACL injuries usually go on to need replacement or reconstruction, followed by **physical therapy** and bracing.

our team

Jeff Mikutis, DO

**Attending Director,
Sports Medicine,
Orthopaedic surgeon**



Dr. Mikutis received his medical degree from the University of New England College of Osteopathic Medicine in pediatric orthopaedics. He completed his residency at Texas College of Osteopathic Medicine in Fort Worth, Texas and his fellowship at Nemours Children's Clinic in Jacksonville, Florida. After 21 years in the Air Force and 12 years as a board certified orthopaedic surgeon, Dr. Mikutis joined Dayton Children's full-time in 2004. Dr. Mikutis has extensive experience performing ACL reconstruction surgeries with expertise in pediatric patients.

when asked why he chose his specialty: "I've always enjoyed working with my hands and building things, from erector sets to scale models of aircrafts, ships and buildings. I felt that I could translate my perfectionist tendencies in building things into fixing people. Having participated in a number of sports growing up, including baseball and attaining a black belt in Tae-Kwon-Do, I directed my interest towards sports medicine. I could not imagine doing anything else in medicine other than orthopaedic surgery."

special interests: Dr. Mikutis specializes in pediatric sports medicine and fracture care.

personal interests:

Traveling, history buff, working on model airplanes, golfing

Alvin Jones, MD, MS

Attending Orthopaedic surgeon



Dr. Jones earned his Bachelor of Science degree in research training and his MD and MS from the University of Pittsburgh in Pittsburgh, Pennsylvania.

He served as a general surgery preliminary intern at East Carolina University in Greenville, North Carolina.

Before joining Dayton Children's in August 2016, Dr. Jones served as an orthopaedic surgery resident at West Virginia University then as a surgery fellow for the Cincinnati

Children's Hospital Medical Center in Cincinnati, Ohio.

when asked why he chose his specialty: "I started out in research and general medicine, but realized I could really make a difference focusing on pediatric orthopaedics. I chose Dayton Children's to practice because it is a good time to be part of the amazing changes going on with this organization. They are always exploring new options for kids and I have great partners here."

special interests: Dr. Jones is especially interested in pediatric orthopaedics of the hip and spine.

personal interests:

Self-professed foodie, traveling and trying new things like golf and biking

Melissa Martinek, DO, PhD

Attending Orthopaedic surgeon



Dr. Martinek received her medical degree at Virginia College of Osteopathic Medicine in Blacksburg, Virginia. She completed her orthopaedic surgery residency at University Hospitals Regional Medical Center in Richmond Heights, Ohio, and her pediatric orthopaedic fellowship at St. Christopher's Hospital for Children/Philadelphia Shriners' Hospital in Philadelphia. Before coming to Dayton Children's, Dr. Martinek worked as a pediatric orthopaedic surgery attending at HSHS Medical Group in Springfield, Illinois.

when asked why she chose her specialty: The variety in pediatric orthopaedics is exponential and exciting! I feel very fortunate that I get to be a small part of a child or teenager's life and can work with them to get them back to their passion; whether it be school, sports, music, theater, or whatever they find joy in.

I chose Dayton Children's because of the enthusiasm that exudes from the hospital and their focus on what matters; kids and their families.

special interests: Lower limb deformity and length discrepancy, club foot, foot and ankle, trauma, sports injuries

personal interests:

Traveling, hiking, bike riding, gardening, and reading historical fiction

Craig Shank, MD

Attending Orthopaedic surgeon

Dr. Shank received his medical degree from the University of Toledo College of Medicine. He completed orthopaedic residencies at Mount Carmel Medical Center and Nationwide Children's Hospital in Columbus, Ohio. Dr. Shank also completed a fellowship in pediatric orthopaedic surgery at Seattle Children's Hospital in Seattle, Washington.



when asked why he chose his specialty:

"I want to help kids enjoy life."

special interests: Dr. Shank has special interest in pediatric trauma, foot and ankle deformity, pediatric hip disease, and scoliosis. He has also completed research on pediatric hip and elbow disorders.

personal interests:

International medical missions, running, skiing, hiking, reading, professional and intercollegiate athletics

Sarah Steward, MD

Attending Orthopaedic surgeon



Dr. Steward earned her medical degree from the Medical College of Wisconsin. She then completed an internship and residency in orthopaedic surgery at the University of Virginia, followed by another orthopaedic surgery residency at Medical College of Wisconsin. Dr. Steward completed her fellowship at Cincinnati Children's Hospital Medical Center before joining Dayton Children's in 2019.

when asked why she chose her specialty: "I am able to treat patients hands-on and it is gratifying to see results very quickly. Also, I was heavily involved in sports as I grew up and now enjoy taking care of the next generation of young athletes."

special interests: Pediatric sports injuries, arthroscopic surgery, knee injuries, treatment of fractures

personal interests:

Spending time with family, working out, cycling, cooking/baking and learning to play piano

Morgan Hagerman, MS, CPNP

Advanced Practice Registered Nurse

Morgan attended the Ohio State University for undergraduate and graduate studies to become a pediatric nurse practitioner. She started her career in primary care. Morgan joined the orthopaedics team at Dayton Children's in 2017.



when asked why she chose her specialty:

"I have always wanted to work with kids because they are so fun and adorable! Growing up, I was always involved in sports, so I have had many visits to orthopaedics and sports medicine doctors. Now, I'm inspired by these kids' motivation to return to sports and play. I enjoy watching patients progress from one visit to the next and encouraging them along in the process."

personal interests:

Being with my family, hiking, pilates, yoga, baking and cooking

Lora Scott, MD

Program director, sports medicine



Dr. Scott is the program director of primary sports medicine at Dayton Children's. This is a new specialty that focuses on the non-surgical care of athletes. Dr. Scott obtained her medical degree from St. Louis University School of Medicine in St. Louis, Missouri. She completed her general pediatrics residency at the University of South Florida in Tampa, Florida and her fellowship in primary care sports medicine at Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio. She worked as one of the primary care physicians for the University of Cincinnati Bearcats before joining Dayton Children's in 2011.

when asked why she chose her specialty: "I saw a gap in care for young athletes, dating back to my own career as a young athlete. Many were safely participating in sports with minor medical conditions and injuries, but their sports performance was diminished because they needed a different treatment plan than their non-athletic peers. I went into pediatrics, followed by extra training in sports medicine, to bridge this gap. My typical patient today is an adolescent athlete who has a minor injury, illness or medical condition which affects their play, but is not bad enough to need extended time out of sports. I love helping them recover and developing a treatment a plan so that the same problem does not happen in the future."

special interests: Lower limb deformity and length discrepancy, club foot, foot and ankle, trauma, sports injuries

personal interests:

Camping, traveling, medical mission work, family, swimming



Ann Smith, PT, DPT, MS, PCS, OCS Director OT/PT

Ann graduated from Northwestern University in Evanston, Illinois and received her doctorate in PT from Rocky Mountain University in Provo, Utah. She completed a developmental fellowship at Georgetown University and is board certified in orthopaedics and pediatrics.



favorite thing about working at Dayton

Children's: "Being able to interact with an amazing team of professionals and our fantastic patients. It is truly a great place to work!"

John Steiner, PT

Manager rehabilitation services

John graduated from Indiana University and has nearly 30 years' experience specializing in orthopaedics/sports medicine.



favorite thing about working at

Dayton Children's: "Kids are always upbeat and want to get well."

Luke Barhorst, DPT

Luke graduated from the Ohio State University and the University of Dayton.



favorite thing about working at

Dayton Children's: "Helping athletes get back into their sport - at an even higher level!"

Mike Breneman, DPT

Mike graduated from Wright State University and the University of Dayton.



favorite thing about working at

Dayton Children's: "The diversity of the types of injuries I treat, and the enthusiasm my patients bring to rehabilitation."

Lynette Keenan, MPT

Lynette graduated from Cedarville University (BSN) and Andrew's University (MPT).

favorite thing about working at Dayton Children's: "I love our team, the kids we see and what we get to teach them!"



Lucy Patton, DPT

Lucy graduated from Ithaca College in New York with her degree in physical therapy.

favorite thing about working at Dayton Children's: "I love helping our patients achieve all their goals and return back to their desired activities and/or sports."



Emily Puthoff, DPT

Emily graduated from Northern Kentucky University and the University of Dayton.

favorite thing about working at Dayton Children's: "The smile on a patient's face when they have reached their goals."



Sam Schwendeman, DPT

Sam received his bachelors and masters degrees in physical therapy from the University of Cincinnati.

favorite thing about working at Dayton Children's: "The opportunity to work with motivated kids to help them reach their goals."



Kelly Adams, PTA

Physical therapy assistant

Kelly graduated from Clark State Community College.



favorite thing about working at Dayton Children's:

"I love the welcoming, friendly atmosphere. I was nervous about working at such a big company, but several people have offered to help me along the way and have provided a personal touch that makes me feel that my role is very much a part of something great! I love the unexpected laughs when working with the kiddos and seeing the progress they make—especially getting to see them return to their chosen sport or daily activities that they haven't been able to do for a while."

Josh Collier, PTA

Physical therapy assistant

Josh graduated from Clark State Community College.



favorite thing about working at Dayton Children's:

"I feel privileged to be in a position to help youth in my local community."

Natalie Eggers, PTA

Physical therapy assistant

Natalie graduated from Wright State University with a degree in exercise physiology and from Clark State Community College.



favorite thing about working at Dayton Children's:

"Getting athletes back to their sports – I enjoy seeing the progress they make with each appointment, and celebrate each patient's success as they return to the sport they love."

Colin Hoke, PTA

Physical therapy assistant

Colin graduated from Sinclair Community College

favorite thing about working at Dayton Children's:

"I love helping kids get back into their sport."



Danell Shirey, PTA

Physical therapy assistant

Danell graduated from Rhodes State College.

favorite thing about working at Dayton Children's:

"Watching the faces of children and their parents light up with excitement as they achieve their goals, big and small!"



Tim Spoleti, PTA

Physical therapy assistant

Tim graduated from Sinclair Community College.

favorite thing about working at Dayton Children's:

"Working with patients to help them have a quick recovery and return to sports."



success stories



Kareem Khasawneh: a beautiful comeback

For Kareem Khasawneh, soccer really is “the beautiful game.” The 16-year-old loves almost everything about it—the teamwork, the footwork, the practices and the games, watching the World Cup on television and following the career of his favorite player, Argentina’s Lionel Messi. But there’s one aspect of the game Kareem does not love: the injuries.

“In the last seven years, I’ve broken my foot, sprained my thumb, strained my knees, and rolled my ankles more times than I can count,” says the junior at Miamisburg High School. “All while playing soccer! My dad jokes that maybe I should take up something less active, like chess.”

Kareem's worst injury yet happened in September 2016, when he was playing in a game against Butler High School. "I was chasing down the ball and stopped suddenly to change direction when my left knee hyperextended," he says. "I dropped to the ground and started screaming, the pain was so bad. I remember my dad hurrying down to the field while my coaches and trainer huddled around me."

a serious diagnosis

The pain subsided, but when Kareem's knee remained stiff and sore the next day, his parents took him to Dayton Children's. Tests confirmed that he had torn his anterior cruciate ligament (ACL), one of the major ligaments in his left knee. Within a couple of weeks, the Khasawnehs met with Jeffrey Mikutis, DO, a pediatric orthopaedic surgeon at Dayton Children's, to talk about treatment options. Dr. Mikutis explained that repairing the ACL would mean surgery and a long recovery. "Dr. Mikutis said I would need to have physical therapy before my surgery and for another year afterward before I could be cleared to play soccer again—I almost couldn't believe it," Kareem says. "He sent me home with a fancy brace to add to my collection, and we scheduled the surgery for just after Christmas, so that I wouldn't miss any school."

The surgical repair would involve removing what was left of Kareem's ACL, and using part of his hamstring tendon (located in the inner thigh) to create a new ACL. After the two-and-a-half hour procedure, Dr. Mikutis emerged from the operating room and gave Kareem's parents a thumbs-up: everything had gone well. Within a few days, Kareem would be back in rehab and working hard on his recovery.

Somehow, physical therapy seemed less like work and more like fun to Kareem. "My therapists turned my exercises into games and competitions, so I was never bored," Kareem says. "Plus, we almost never talked about my knee, we just sort of talked about life. We got to know each other really well—like friends. I could tell that I was getting better, and that was fun, too."



a true team effort

Throughout the spring of 2017 and into the summer, Kareem worked hard at his physical therapy appointments and did his home exercises faithfully. Kareem's parents were impressed, not just with Kareem's progress, but with the team that was taking care of him. "From A to Z the team was awesome—all positive, caring, encouraging and motivating," says Kareem's dad, Abdel. "Dr. Mikutis and the physical therapists took care of him just as if he was their own son. We can say thank you, but we can never say thank you enough for all they did to help Kareem."

As Kareem's knee got stronger, he was able to run, lift weights and even take up boxing, something he found he enjoyed. When the varsity soccer season started that fall, Kareem sat on the bench and cheered his team on. "That was actually tough sometimes, because my knee was feeling great," he says. "During one big game, I was like 'forget this, I'm playing.' But I knew that would just make the healing process take even longer."

back on the field

Kareem's last day of physical therapy was almost a year to the day after his surgery, and he wowed everybody with a two-hour session resembling a CrossFit workout. "I was jumping, sprinting, changing direction, doing sit ups, lifting weights—it was crazy, I was drenched with sweat," Kareem says. "At the end, Dr. Mikutis said I was cleared for soccer. I cried a little because I was so happy. It had been such a long journey."

Today Kareem says his knee feels stronger than ever, and he's excited about returning to the soccer team. He'll have to wear a special brace to protect his knee, but Kareem doesn't mind. It's a reminder of how hard he has worked, and how far he's come.





Kelsey Faris: Kelsey's keys to success

Success doesn't happen by accident, in sports or in life. That's something Kelsey Faris learned as a soccer player, especially during her long recovery from a knee injury. Now, looking back on the ACL tear that sidelined her for nine months, she attributes her success to three key factors.

determination

Kelsey knew that the pain in her knee was something serious when she went down during a varsity soccer game in August 2017. Just 24 hours later, she was at the Dayton Children's emergency department for tests. Magnetic resonance imaging confirmed that Kelsey had torn her anterior cruciate ligament (ACL).

Kelsey, then a junior at Greenview High School in Jamestown, Ohio, went to see Jeffrey Mikutis, DO, a pediatric orthopaedic surgeon at Dayton Children's. He recommended surgery, explaining that if everything went well, Kelsey could rejoin her team for the Fall 2019 season—almost a year away. “Dr. Mikutis has a lot of experience repairing ACL tears, so I felt good about that,” Kelsey says. “But once we scheduled the surgery, I really started to worry that something would go wrong. I had never had major surgery before. I was really scared about it.”

The surgical repair went well, and soon it was time for Kelsey to begin the real work of her recovery: rehab. And so, three times a week for the first few months, she drove to the Dayton Children's south campus for an hour-long physical therapy session. Then at night, she'd do more exercises at home to build strength, sometimes asking her younger brother for help. “I was so determined to get back to soccer for my senior year,” she says. “It seemed like I was ahead of schedule the whole time, and I'm proud of that. Sitting on the bench during games that season was really hard, especially when we got deep into the playoffs. But I just worked and worked.”



a great team

No one achieves success alone, and that was certainly true for Kelsey. Her “ACL recovery team” included a super supportive family, Dr. Mikutis and his surgical staff, and a very dedicated physical therapist at Dayton Children’s, Lucy Patton. “Rehab was a grind sometimes, and many times I would just sit there and cry,” Kelsey says. “But Lucy made me want to keep going, she always believed in me. She knew when I was pushing myself too hard, and I knew when she wasn’t pushing me hard enough, so we balanced each other out.”

On the home front, Kelsey’s parents, Joe and Trisha, focused on keeping Kelsey’s spirits up every step of the way. “As a mom, I became her biggest cheerleader,” Trisha says. “If she was down, I felt like my job was to tell her, ‘you know what, this is for you. If you want to do this, keep going. If you don’t want to play again, that’s fine too—do what makes you happy, I’ll support you no matter what.’”



a positive attitude

Kelsey says the first six weeks after surgery were the toughest, but milestones along the way helped her stay positive. Walking without the help of crutches was a big moment, as was graduating from a hard brace to a soft one. She was able to start running again by February 2018, and do soccer drills by spring. In June, Kelsey’s teammates voted her team captain. “All along the way, I kept believing that rehab was going to work for me if I just kept working at it,” she says. “Now that I can play with my team again, I feel really good. It’s so great to be back on the field for my senior year.”

In addition to teaching her a lot about patience and hard work, Kelsey’s ACL experience has given her some direction for the future — she’s considering a career in physical therapy, perhaps with the United States military. No matter what Kelsey decides to do, we have a feeling she’s going to be a big success!



pain control and prehabilitation before surgery

pain control

One of the major causes of pain following a knee injury is the fluid and blood within the knee joint. The knee often appears swollen with limited motion and weight bearing is either painful or impossible. Crutches may be used temporarily in addition to a brace to keep the leg from moving (**immobilization**) to help stabilize the knee and reduce pain. Swelling responds well to the acronym **RICE**:



Rest



ICE



Compression



Elevate

We also encourage anti-inflammatories (naproxen, ibuprofen) in the initial injury phase to help reduce inflammation. Hydrocodone, a narcotic, may also be prescribed by your provider for **breakthrough pain**. But in many cases, we wait to prescribe it until after surgery.

knee immobilizer and crutches

Your doctor will discuss how often to use your knee immobilizer and crutches based on other injuries you may have.

prehabilitation

Before surgery, we will work with your child in prehabilitation (pre-surgery rehab) to return their knee back to the size and strength they had before their injury. Research shows that this helps better prepare the knee for surgery. A few visits with our physical therapists are also very important in helping to lessen pain. The main goals of prehab are preparing the knee for surgery by reducing the **joint effusion**, regaining knee motion and working on the muscles in the upper thigh (**quadriceps**). Meeting these goals is important for the best timing of surgery.

goals for prehab:

1. Reduce swelling

o Goal: Both knees the same size prior to surgery

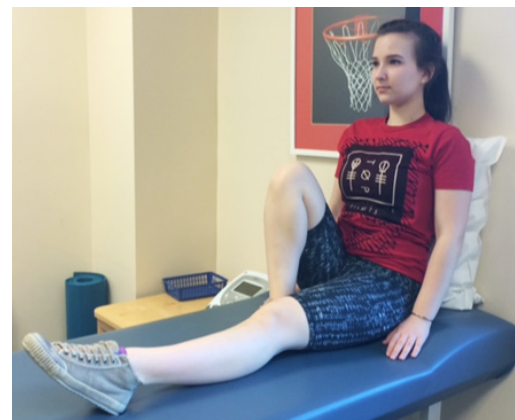
- Ice 3-4 times/day for 15-20 minutes
- Add compression with an ace bandage/compression sleeve
- Use crutches as instructed
- Elevate your leg as much as possible



2. Knee extension

o Goal: Fully straighten out the knee

- Sit with towel under ankle and knee straight for 10-15 minutes
- Tighten your thigh and press the back of your knee down
- Heel slides – Bend and straighten the knee 20 times



3. Knee flexion

o Goal: The knee should be able to bend at least 120 degrees.

- Heel slides – Bend and straighten the knee 20 times
- Exercise bike for 10-15 minutes/day (adjust seat height for comfort)
- Hamstring curls – Lay on your stomach and bend knee 20 times



4. Quadriceps strength

o Goal: Make them as strong as possible before surgery.

- Keep your leg straight and raise it 10-20 times
- Mini-squats/squats and lunges, 10x/each

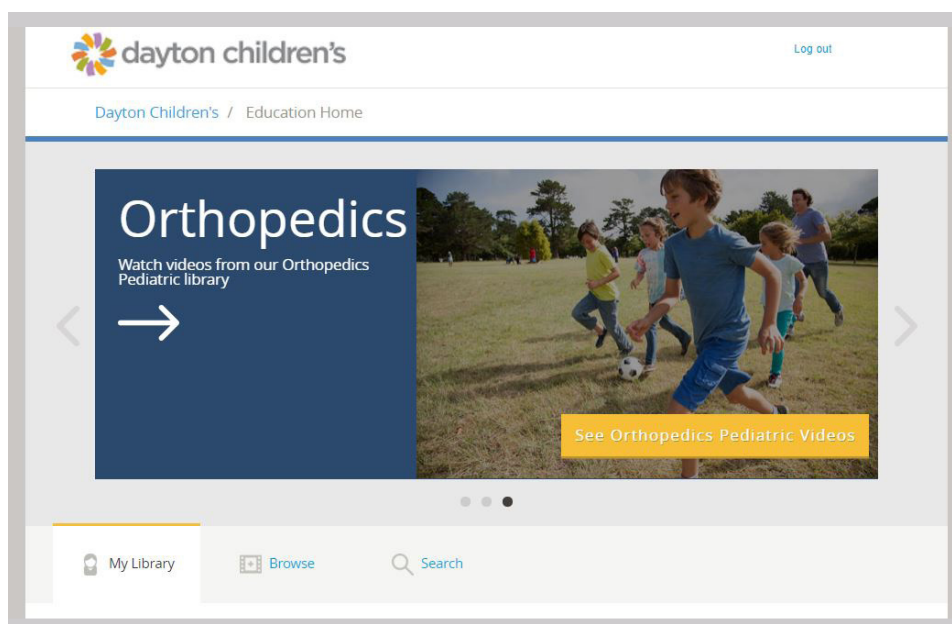


surgery

This can be a very stressful time for you and your child. That's why the time spent preparing for surgery and recovery is so invaluable. We believe that learning about what is to come and getting answers to your questions can help reduce stress. If you have concerns, we encourage you to discuss them with your nurse. While we are very good at what we do, no one knows your child better than you. We encourage you to be an advocate for your child. If you feel something isn't right, please let us know. You will be able to stay with your child the entire time they are in the hospital. Our staff can also connect you with resources to help with your child's emotional health.

before your child's surgery

- Contact your child's insurance company for any special requirements.
- Notify us of any special needs (for example, language interpreters).
- Contact your child's school office to let them know about the absence. The school may need to arrange homework assignments or a tutor for an extended absence. Most patients do not return to school for 10-14 days following surgery. This gives time for the pain and swelling to subside, and to make sure they are safe on crutches in a crowded environment.
- Make sure you're signed up for MyKidsChart, and have accessed your GetWell Go pre-surgery pathway. MyKidsChart is an online portal to access your child's health information. If your child is 14 or older, they can create their own account. Once you login, click "My GetWell education," and it will pull up the pre-surgery pathway. Complete the pathway before you arrive for your child's surgery, and let us know if you have any questions.



what should I do the day before surgery?

- Bathe or shower the evening before or the morning of surgery (be sure to wash your hair).
- During pre-surgery teaching, your child will receive a bottle of chlorahexidine to wash with the night before surgery.
- Remove any metal jewelry, including all piercings.
- Remove any nail polish. An oxygen saturation monitor (a little clip that goes on your finger) will be placed on your finger during surgery. The monitor shines through the nail bed to measure how much oxygen is in the bloodstream. This can be difficult to read if your nails are painted.
- Do not apply lotion the day of your surgery. Lotion can make it difficult for tape to stick to the skin correctly and can increase the risk of infection.
- Do not wear makeup the day of surgery.
- Put long hair up with a nonmetal hair ponytail holder. Please part your hair in the middle from front to back, and fix the hair in pigtails that start behind each ear. Secure them with a hair fastener that does not have any metal in it. Your hair should be clean and dry with no hair products in it.
- Remove contact lenses and bring eyeglasses.
- If applicable, remove any removable mouth appliances (e.g., retainers).
- Do not take any aspirin or ibuprofen (like Aleve, Advil or Motrin) two weeks before surgery.
- If your child is old enough to smoke or drink alcohol, they are not to do so for two weeks before surgery. We also recommend that your child quit smoking to protect their health.

don't eat

Do not eat solid foods (including candy, chocolate or chewing gum), or drink milk. You will get a phone call from one of our pre-surgery nurses with specific times to stop eating and drinking.

what to bring with you the day of surgery

- Health insurance card and photo identification.
- Health insurance co-payment.
- Medicines that your child takes including inhalers, vitamins, herbals and over-the-counter drugs in their original containers.
- If your child is bringing their contact lenses, bring contact lens solution, contact lens case and eyeglasses.
- If your child is bringing removable mouth appliances such as retainers, bring the appliance case.
- If your child is 18 years old or older, bring a copy of their living will or advance directives.

ACL reconstruction

The ACL is the most commonly injured ligament in athletes. Over 150,000 ACL surgeries are performed annually in the United States. There are a few different ways to perform reconstruction of a torn ACL. Our experienced orthopaedic surgeons discuss all surgical cases weekly and work together to stay current in the best techniques and practices.

The main goal of ACL reconstruction is to recreate a safe, stable knee by placing a “new” ACL in the position for your body. The “new” ACL, or graft, may be taken from the patient (**autograft**), or it may be a prepared cadaveric tendon (**allograft**). Allografts are not a preferred choice for athletes that participate in contact sports.

Different types of grafts are used for ACL reconstruction. Your surgeon will carefully evaluate your child’s knee and will take into account their age, whether they are finished growing, their level of sports participation and their future athletic goals to recommend the best graft.

We perform many types of ACL surgeries for young children:

1. For patients 10 and younger: Physeal sparing surgery.
2. For females 10-12 years old and males 13 and younger: Ephyseal approach
3. For patients who are finished or nearly finished growing: Adult type ACL reconstruction. These include:
 - a. Bone-Tendon-Bone
 - b. Hamstring tendon
 - c. Quadriceps tendon
 - d. Allograft

Your surgeon will discuss with you the best surgical option for your child, taking into consideration their age, anatomy, what structures need to be addressed and activity/athletic level.

Other injuries may need to be repaired as well, such as meniscal tears or cartilage damage. Your surgeon will discuss the repair of these injuries and their possible impact on rehabilitation.

type of graft	description	advantages	disadvantages
Bone-Tendon-Bone (BTB) Frequently chosen for the young athlete because of its excellent clinical results and high level of patient satisfaction in long-term follow-up studies.	Harvested from the middle third of the patellar tendon: the tendon between the knee cap and the lower leg bone. In addition to the tendon, bone pieces at each end of the tendon are taken to serve as anchors that heal into the bone tunnel where the graft will be inserted.	<ul style="list-style-type: none"> • Resembles the ACL in length • Bone ends of the graft are positioned in the bones where the ACL attaches • “Bone-to-bone” healing occurs which is considered to be a strong healing method • Decreased risk of revision (failure) especially with kids and teens. 	<ul style="list-style-type: none"> • Slight increased risk of patellar fracture (less than 1 percent) • Pain behind the knee cap • Pain with kneeling
Hamstring tendon <i>One of the most commonly used grafts for ACL reconstruction</i>	Grafts are taken from one or two of the muscles on the back of the thigh and are twisted together to form a new graft for the ACL.	<ul style="list-style-type: none"> • Patients usually report less pain and stiffness right after surgery • Smaller incisions • No risk of patellar fracture • No pain with kneeling 	<ul style="list-style-type: none"> • Slower healing (no “bone-to-bone”, or BTB, contact) • Longer time to become ‘rigid’ and provide stability • Reduced knee flexion strength • Increased failure rates compared to BTB

more on next page

type of graft	description	advantages	disadvantages
Allografts <i>Allografts can be used with non-athletic individuals, multi-ligamentous injuries or in revision surgeries.</i>	Taken from cadaver tissue and include BTB or hamstring grafts in addition to tendon Achilles grafts. They are sterilized prior to being used in surgery.	<ul style="list-style-type: none"> •No donor site pain •Shorter operating time •Less pain following surgery 	<ul style="list-style-type: none"> •Higher failure risk when used alone, although the risk remains very low •Delayed recovery time •Higher risk of infection • Not for high performance athletes
Quadriceps tendon	Taken from top part of the patella and central third of quadriceps tendon	<ul style="list-style-type: none"> •Does not violate patella tendon •Large graft 	Only one end bone-to-bone healing
Iliotibial band	Taken from the outside of the thigh	<ul style="list-style-type: none"> •Used for smaller skeletally immature patients •Excellent track record 	<ul style="list-style-type: none"> •Incision on the outside of the thigh •Larger incisions

after surgery

pain control

An ice machine will be placed on your child's knee. This is a great tool for pain relief. Please refer to the ice machine instructions for proper use.

A short course of narcotic pain medicines will be prescribed. Please stay ahead of your child's pain by using this as needed the first few days. Ibuprofen may also be used to decrease swelling and pain.

bracing and ambulation (walking)

Your child will leave surgery with a brace and post-operative dressings in place. Please leave this in place until your follow-up visit with your surgeon or physical therapy. Your child will leave with crutches. Please carefully follow the weight-bearing restrictions outlined by your surgeon as they are essential to your recovery.

bathing

Please keep dressing clean and dry until the first follow up appointment. Sponge baths may be the easiest to tolerate during the first week. We will usually let your child shower the fifth day after surgery. Your child should not get in a bath/hot tub/swimming pool/lake until cleared by their physician or therapist.

diet

Good nutrition is essential to healing. After surgery, we recommend light, frequent meals for the first few days with plenty of fluids to rehydrate you. Many patients experience constipation related to the pain medications. We recommend taking a stool softener daily, but let your physician know of any problems with medicines.

activity

The first day after surgery is usually one of rest. Before surgery, it is important to establish where your child can safely sleep and use the restroom – preferably on the ground floor. The ice machine will be a big help with pain control and should be used as much as possible. The next few days your child will need help positioning their leg and getting up to read, watch television and eat, and getting in and out of the restroom safely. Physical therapy usually begins two to five days after surgery.

physical therapy

Physical therapy (PT) is a vital part of your recovery from ACL surgery. We offer physical therapy at several different Dayton Children's locations. (See the list below). We will work with you to schedule your child's PT at the location that is most convenient for you.

Your first post-operative PT/follow-up visit will be scheduled at the same time we schedule your surgery. Hopefully we have met your child before their surgery. If so, they will already know the exercises to perform for the first few days after surgery that we have listed below.

Your PT will provide you with your child's detailed exercise book at your first appointment.

goals	brace	exercises
1. Protect the graft/fixation 2. Decrease pain/swelling	Keep brace in place to protect graft	<ul style="list-style-type: none">• Ankle pumps• Quad sets• Gentle heel slides• Hip abduction/adduction• Straight leg raises with brace locked
Early range of motion – Emphasis on full extension and early quadriceps activation	Unlock brace for gentle range of motion exercises	Heel props – Place rolled towel under ankle, and allow leg to relax for 5-10 minutes.
Weightbearing – As tolerated with brace locked in extension <i>Meniscal repair or microfracture – NO weightbearing for 4-6 weeks</i>	Brace locked at 0° while walking on crutches Weightbearing per physician/PT instruction	Use ice machine as much as possible for pain and swelling. Make sure pad is not directly in contact with skin. A thin towel works well.

KOOS survey

The most important outcome is that your child feels their knee is steadily improving. We use an outcome survey designed for children and adolescents to see how they are doing. It asks how their knee is feeling, and whether there are any associated problems with performing normal day-to-day activities and returning to sports. The survey takes 10-20 minutes to complete. We will ask your child to complete the survey before surgery and at 3, 6 and 9 month intervals.

Knee and Osteoarthritis Outcome Score for Children (KOOS-Child), English version LK2.1, updated October 2015 ¹

KOOS-Child KNEE SURVEY

Today's date: _____ Date of birth: _____

Name: _____

INSTRUCTIONS

These questions collect information about how your injured knee affects you. Answer every question by ticking the appropriate box, only one box for each question. If you are unsure about how to answer a question, please select the best answer you can.

KNEE PROBLEMS

S1. During the past 7 days, how often has your knee been swollen?

Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always ☐

S2. During the past 7 days, how often has your knee made any noise/sounds?

Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always ☐

S3. During the past 7 days, how often did your knee get stuck?

Never ☐ Rarely ☐ Sometimes ☐ Often ☐ Always ☐

S4. During the past 7 days, how often have you been able to fully straighten your knee on your own?

Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐

S5. During the past 7, days how often have you been able to fully bend your knee on your own?

Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐

S6. During the past 7 days, how much difficulty have you had moving your knee just after waking up in the morning?

No difficulty ☐ A little ☐ Some ☐ A lot ☐ Extreme difficulty ☐

S7. During the past 7 days, how much difficulty have you had later in the day moving your knee after being sedentary for a while?

None ☐ A little ☐ Some ☐ A lot ☐ Extreme ☐

P1. During the past month, how often have you experienced knee pain?

Never ☐ Rarely ☐ Sometimes ☐ Often ☐ All the time ☐

weekly rehab protocol and bracing expectation

These will be inserted into the binder separately. The instructions are different depending on the type of surgery done. Ask your physical therapist if they are not included.

return to sports

The return to sports timeframe for ACL reconstruction is different for each patient and is based on several factors. These factors include:

- The type of surgery
- What sport(s) the athlete is involved in
- Progress with rehabilitation
- Knee stability
- Objective testing

The minimum return to play (supported by numerous research articles) is nine months. Many researchers recommend a 12-24 month wait before return to play.



Regaining strength, balance and agility, and the ability to stabilize the knee during the high demands of pivoting and cutting sports are all very important. Our goal is not just to help your child regain full range of motion and strength, but also to help your child regain the ability to “trust” their knee with all activities before returning to the playing field.

We perform weekly measurements in PT, and use the **Biodex** for isometric/isokinetic testing to test the strength of your muscles at different speeds. We also hold a monthly knee clinic with our surgeons and encourage our post-op patients to attend usually at one, three, six and nine months after surgery. At the knee clinic, the entire rehab team is available to review testing results and answer questions.

sports medicine



sports medicine

Our sports medicine team is an integral part to your child's diagnosis and recovery. Our certified and fellowship-trained sports medicine experts are dedicated to the care of athletes. We understand how an injury may impact growth or how growth might impact rehab. For a growing athlete, that can mean a huge difference in recovery and return to play.

Our athletic trainers work with athletes from age five through college, and often make the initial diagnosis of an ACL tear. By working many athletic events, they can provide first care and triage of an injury. Once an athlete is seen in the sports medicine clinic, and it is determined that they have an ACL tear, the child is referred to orthopaedics and rehab.

When an athlete is ready to return to sports, the sports medicine team's athletic trainers help apply the patient's PT training and exercises to their specific sport. Athletic trainers are the first line of defense against acute knee injuries, and the final assist before returning to play. Athletic trainers train athletes in sport-specific return to play procedures to make sure the athlete has minimal risk, and maximum strength and endurance to get back in the game.

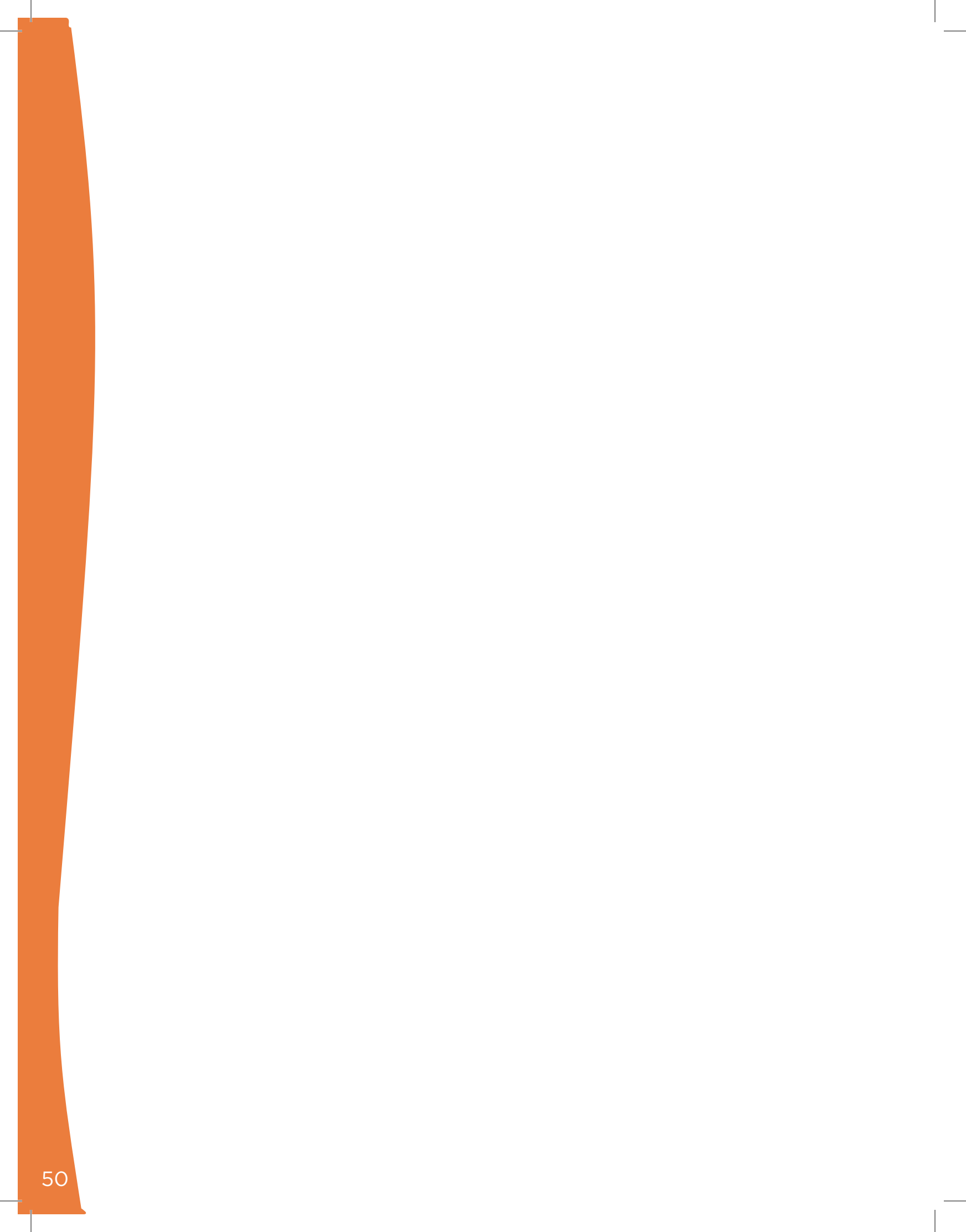
Sportsmetrics™

As part of your child's recovery, they will likely go through the Sportsmetrics™ training program run by our athletic trainers. Sportsmetrics is a scientifically proven, six-week jump training program that incorporates proper stretching, special plyometric exercises and weight training. It focuses on developing overall leg strength as well as improving balance in strength from the front to the back of the thigh.

Athletes do 12 to 18 one-hour sessions challenging their bodies to execute jumps, cone and footwork drills and core strengthening all while gaining positive feedback from an athletic trainer. Student to teacher ratios are kept to 6 to 1 or better to make sure each athlete receives personalized recommendations and attention. Through specialized progression of jump/plyometric drills, athletes learn proper techniques for jumping and landing; increase overall leg strength and improve symmetry in right-to-left leg power. Each session builds on the previous one, developing technique and enhancing performance.

Neuromuscular training not only increases muscular power and jump height, but also decreases stress and impact at the knee. The strength and flexibility components have been carefully reviewed for safety and effectiveness. Our ACL Bridge Sportsmetrics program is specifically designed for athletes returning to play after ACL reconstruction.





frequently asked questions

NOTE: Throughout this section, we will use you/I, meaning the patient.

when will I be able to return to sports?

Before your surgery, you will be allowed to do very limited exercise. This includes upper body strength training, core strength training and your physical therapy program. Depending on your sport, it may be ok to sit in a chair and practice shooting a basketball or hitting a volleyball. Do not expect to be very good at it! After surgery, you may continue doing these activities. Physical therapy will slowly advance any lower body exercises as you recover.

Typical return to sports is no sooner than 9 months. Average return occurs between 9 and 12 months post-op. The length of time varies based on how quickly your body heals, how often you do your home exercises, and the individual demands your sport places on the knee. For example, someone who plays golf can usually return quicker than someone who plays soccer.

We take a comprehensive team approach to allowing patients to return to sports. Physical therapists, your surgeon, parents and coaches will all be involved in assuring the safest return to sports. Nationally, the average rate of re-injury after ACL reconstruction is 30 percent. This is why taking time to heal properly is so important.

what should I expect the first few days? will I need pain medication?

You will have a nerve block performed by an experienced anesthesiologist. This helps with pain relief for the first 12-24 hours.

You will go home with an ice machine included in your post-op dressings. It is extremely helpful for pain control and we strongly encourage using this. You will also be fitted with a knee brace and crutches.

We will prescribe a short duration of narcotics to be used along with an anti-inflammatory like ibuprofen.

Physical therapy should begin within two to five days of surgery. There are many studies showing the incredible value of early physical therapy in reducing pain and improving function.

when can I shower?

We recommend waiting five days following surgery before getting in the shower.

will I need crutches? how soon will I be able to walk?

Crutches are needed for the first few weeks after surgery. You are advised to only place half of your body weight on your repaired knee for the first two weeks after surgery. Then, you may be able to gradually return to full weight-bearing with a supportive knee brace.

will I have to wear a brace after surgery? for sports?

A post-operative knee brace will be provided and fitted to the injured knee. It should be worn when up and around until rehab is complete. An additional sports brace may be prescribed for up to 1-2 years after surgery.

when do I get a smaller brace?

Usually, you will get a smaller brace about four weeks after surgery.

how long will I be out of school?

Patients are out of school for an average of seven to 10 days. Typically, after their first visit with physical therapy patients feel more confident in their return, provided they have proper support at school.

what would happen if I don't have surgery?

Many scientific studies have shown timely surgical intervention greatly reduces the risk of other injury due to an unstable knee. Some other injury examples are meniscal tears or damage to the cartilage and joint surface of the bones. These other injuries can increase the risk of early arthritis, as early as in your 20s to 30s.

how long will I be in surgery?

Average ACL repair without other injuries can take around 1-2 hours. The time spent in the recovery room can vary by patient, but the circulating nurse in the operating room will keep your parent informed of updates, usually by phone. Parents can also look at the OpTime boards in the waiting area to stay posted on your progress.

will I need to stay in the hospital?

This surgery is performed outpatient, meaning you go home after the surgery and do not spend the night. However, we may suggest some of the younger patients have a one night stay.

could I develop arthritis in my knee later in life?

After a substantial knee injury, such as an ACL tear, there is a risk of arthritis later in life. However, regaining knee stability with surgery significantly reduces the chance.

will I need to do wound care at home?

The wounds should be clean and dry for at least 5 days. We instruct you to leave dressings in place until the initial physical therapy visit. They will help you or your parent take down the dressings and provide more wound care steps.

what are the risks of surgery?

The risks of surgery are low.

As with any surgery there is a small risk of infection. Before surgery, in the operating room, all patients receive antibiotics and the injured leg is cleansed well with a safe surgical cleansing solution. The risk of post-operative infection is low.

There is a small risk of nerve injury. Our highly trained orthopaedic surgeons and anesthesiologists are very skilled in taking all precautions to preserve all nerve function during this surgery. The risk of long-term nerve damage is very low. There can be some numbness or pain present around the incision site.

There is a risk of knee stiffness after surgery. There can also be risk of injury, such as fracture. These are greatly reduced by following the physical therapy protocol and weekly instructions.

common words and definitions

ACL (Anterior cruciate ligament) - A thick band of fibrous tissue, like a rope, that connects the femur to the tibia. It provides stability to the knee.

Allograft/autograft - Shows where the graft (ACL) comes from. Allograft means the graft is a prepared cadaver tendon. Autograft means the graft is taken from the patient.

Arthroscope - A tool used to look at or operate on the inside of a joint.

Biodes - A piece of equipment that helps patients regain strength and mobility after surgery or an injury.

Breakthrough pain - Pain that comes through even if a patient is taking pain medication.

Cartilage - Tissue that covers the ends of the bones.

Dressing - Bandages used around the surgery site. They need to stay clean and dry after surgery.

Femur - The bone in your upper leg.

GetWell Go - Online access to lots of health videos and medication information. Also where you access your pre-surgery pathway to help prepare you and your child for surgery. Access by clicking "My GetWell education" in MyKidsChart.

Graft - Tissue used to reconstruct the torn ACL.

Immobilization - Keeping the knee from moving with a brace.

Joint effusion – Water or fluid around the joint. For ACL injuries, this build-up is around the knee.

Ligaments – Strong bands of tissue that hold organs in place and connect bones.

Meniscus – Pads that cushion the knee joint.

MyKidsChart – An online portal to access your child's health information, request prescription refills, send messages back and forth to your nurse or physician, and more.

Patellar tendon – Attaches the bottom of the kneecap (patella) to the top of the shinbone (tibia).

Prehabilitation – Physical therapy and rehab movements to help strengthen the knee before surgery. Research shows this helps better prepare the knee for surgery.

Physical therapy (PT) – Uses specific movements to help regain strength, mobility and flexibility, and decrease pain to an injured part of the body.

RICE – An acronym to help remember tips to reduce swelling: Rest, Ice, Compression and Elevate.

Tendons – A tough but flexible band of fibrous connective tissue that usually connects muscle to bone.

Tibia – The bone in your lower leg, or your shinbone.

Quadriceps – The large group of four muscles on the front of your thigh – very important to successful rehabilitation following surgery.



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