Training and dissemination

Training and dissemination are vital components of this grant. Activities include online training, distribution of publications, educational courses, conference workshops, symposia and presentations, newsletters, accessible registries, and state-of-the-art information for clinicians, parents, participants, other health care professionals and researchers. The composite website for dissemination and training is tech4pod.org.

tech4pod.org

For more information

Please contact:
Tech4POD
(414) 288-0697
info@tech4pod.org

Gerald F. Harris, Ph.D., P.E.
Program director
Marquette University—RERC on Technologies for Children with Orthopaedic Disabilities

Tech4POD partners

Marquette University — Be The Difference.
MSOE
Medical College of Wisconsin
Rehabilitation Institute of Chicago
Shriners Hospitals for Children®
University of Wisconsin UW Milwaukee

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Tech4POD

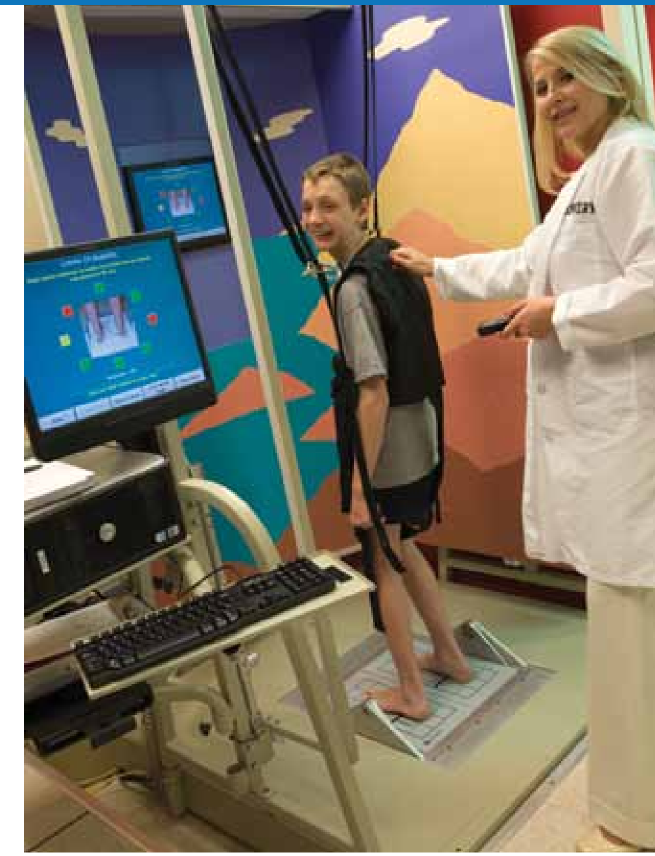
TECHNOLOGIES FOR PEDIATRIC ORTHOPAEDIC DISABILITIES

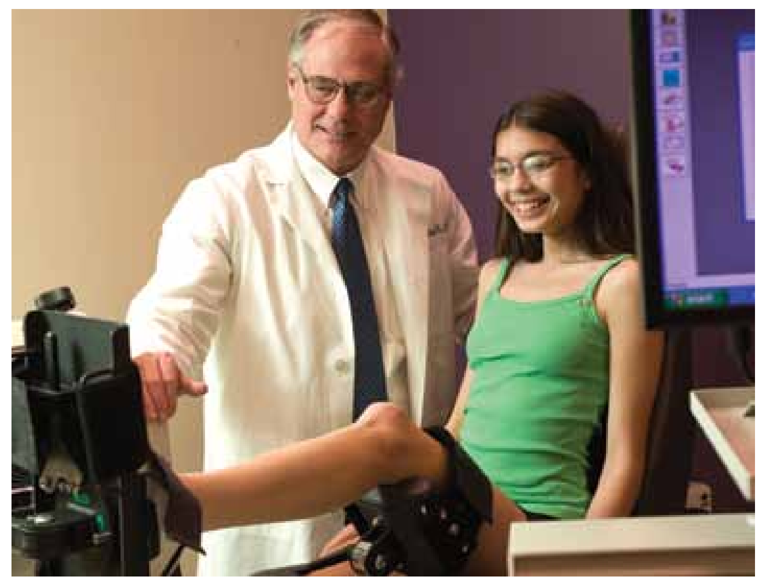
Marquette University
Rehabilitation Engineering
Research Center

Research to help children with orthopaedic disabilities

Tech4POD is a consortium of institutions (Marquette University, Shriners Hospital for Children — Chicago, the Rehabilitation Institute of Chicago, the Medical College of Wisconsin, the University of Wisconsin–Milwaukee and Milwaukee School of Engineering) dedicated to improving the quality of life of children with orthopaedic disabilities. The U.S. Department of Education in 2010 designated the consortium a national Rehabilitation Engineering Research Center at Marquette University.

This combined research focuses on developing new tools, better technologies, and improved treatment strategies for children with cerebral palsy, clubfoot, spina bifida, spinal cord injuries, osteogenesis imperfecta (brittle bone disease) and other orthopaedic conditions.





“Everything we are undertaking is designed to have a direct impact on children, to improve their care, rehabilitation and quality of life.”

Gerald F. Harris, Ph.D., P.E.
Program director
Marquette University—RERC on Technologies for Children with Orthopaedic Disabilities

Research activities

R1: Nano- and microstructural tissue characterization for improved care of children with osteogenesis imperfecta and severe clubfoot deformity

Characterization of tissue through nano- and mircrostructural analysis is the topic of R1, which proposes improvements in care for children with osteogenesis imperfecta (brittle bone disease) and severe clubfoot deformity. Advanced technologies are applied to study tissue-level and structural characteristics. Findings will be used to develop improved assessment and treatment strategies.

R2: Diffusion tensor imaging and restoration of upper- and lower-limb function in children with cerebral palsy

The prognostic value of central nervous system plasticity associated with rehabilitative treatment and changes in brain activity associated with mobility and manipulation will be determined in this project to better direct future rehabilitative intervention of children with cerebral palsy. Advanced imaging technologies employed in R2 include fMRI, DTI and robotic-assisted therapy.

R3: Home-based teleassisted robotic rehabilitation of joint impairments in children with cerebral palsy

Home-based robot-guided therapy and teleassessment will be evaluated to determine their effectiveness in reducing premature declines in long-term mobility of children with cerebral palsy. An integral part of the project is the use of interactive gaming to fully engage patients in the therapeutic process.

R4: Advanced mobility modeling to improve function and longer-term transitional care of children with orthopedic disabilities

This project employs advanced modeling of the upper and lower extremities to improve function and longer-term transitional care of children with myelomeningocele, cerebral palsy, spinal cord injury, osteogenesis imperfecta (brittle bone disease) and planovalgus foot deformities. R4 will determine the relationship among joint forces, assistive devices, ankle arthroreisis and longer-term tissue level effects as they relate to pain and function.

Development activities

D1: Developing a pivoting-sliding elliptical system to improve off-axis neuromuscular control in children with orthopedic disabilities

This project is structured to develop an elliptical machine to improve neuromuscular control and stability in children with patellofemoral instability and cerebral palsy. An interactive gaming approach is used to fully engage patients who use the device. Anticipated development results include improved neuromuscular control and stability and effective interactive gaming.

D2: Three-dimensional pediatric robotic gait training to improve locomotor function in children with cerebral palsy

This project is structured to develop a novel 3-D pediatric robotic gait trainer that allows naturalistic stepping during treadmill training of children with cerebral palsy. The device is designed to improve walking ability through in-home treatment. Anticipated development results include improved walking ability and more effective in-home therapy.

D3: Biplanar fluoroscopic system for dynamic, *in vivo* foot and ankle motion analysis

This project is structured to develop a unique biplanar (3-D) fluoroscopic imaging system for *in vivo* motion analysis of the foot and ankle during walking. This imaging technology will allow real-time assessment of internal bony motion during ambulation. This technology will be coupled with an existing segmental foot and ankle model (Milwaukee Foot Model) for assessment of segmental hindfoot kinetics. Anticipated development results include new knowledge of *in vivo* bony motion in the foot during ambulation; better information for future footwear; and orthotic and prosthetic development.

D4: Three-dimensional fluoroscopy and pressure-validated orthotics in the application of pediatric flatfoot

This project is structured to develop customized orthotics for children with severe planovalgus foot deformities using computer-based rapid prototyping technology. Advanced models are used to construct the orthotic contours based on recorded foot morphology and ambulatory dynamics. Anticipated development results include more effective and comfortable orthotics at reduced cost and production time.