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Advances in technologies for children with orthopaedic disabilities

Among children under the age of 18, an estimated 4.0 million (6.1% of the U.S. population under age 18) have some type of chronic disabling condition or impairment limiting function. Orthopedic impairments represent over 5% of the total population.

This presentation highlights a series of research (R) and development (D) projects based on innovative technologies to assist children with orthopedic disabilities. The projects are supported by a national Rehabilitation Engineering Research Center funded by NIDRR*. Characterization of tissue through nano/micro-structural analysis is the topic of project R1 which proposes improvements in care for children with osteogenesis imperfecta or “ (OI) and clubfoot deformity (CF). The prognostic value of central nervous system plasticity associated with rehabilitative treatment are being determined in project R2 to better direct future rehabilitative intervention of children with cerebral palsy (CP). Project R3 evaluates home-based robot-guided therapy and tele-assessment to determine effectiveness in reducing premature declines in mobility in children with CP. Project R4 utilizes advanced modeling of the extremities to improve the function and care of children with myelomeningocele (MM), CP, spinal cord injury (SCI), OI and planovalgus foot deformities. Project D1 is developing an elliptical machine to improve neuromuscular control and stability in the axial and frontal planes in children with patellofemoral instability and CP. A novel 3D pediatric robotic gait trainer is being developed in project D2 to allow naturalistic stepping during treadmill training of children with CP. A unique biplanar fluoroscopic imaging system is being completed in project D3 for in vivo analysis of foot and ankle motion during walking. Project D4 provides customized orthotics for severe planovalgus foot deformity through computer based, rapid prototyping techniques.

Biography

Dr. Harris is a Professor of Biomedical Engineering at Marquette University and Director of Orthopaedic Research at the Medical College of Wisconsin. He also directs the clinical Gait Lab at Shrines Hospital for Children in Chicago. As Director of the national Rehabilitation Engineering Center for Children with Orthopaedic Disabilities, Jerry leads a multi-institutional team focused on the orthopaedic needs of those with Cerebral Palsy, Myelomeningocele, Clubfoot, Spinal Cord Injury and Osteogenesis Imperfecta. Dr. Harris has served as president of the Engineering in Medicine and Biology Society, North American Society for Gait and Clinical Motion Analysis, and is a Fellow of the American Academy for Cerebral Palsy and Development Medicine. He has authored over 450 publications and three texts.

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