

R4: Advanced Mobility Modeling to Improve Function and Longer Term Transitional Care of Children with Orthopaedic Disabilities

(LE plans for Year #2 of the RERC)









R4: LE Advanced Mobility Modeling

Hypotheses: A)**Fluoroscopically-based** talocrural and subtalar kinetics at baseline will differ significantly following **arthroereisis** (Sta-Peg), B) Joint kinetics at the **hip and knee** at baseline will differ significantly following arthroereisis.

| Activity | YR 1 | YR 2 |
|---|----------------------------|--------------------------|
| Technical system setup and implementation | | |
| Inverse dynamics model development, testing, and integration | | |
| Patient recruitment, screening and baseline assessment | 10 Patients Identified | Identify Patients |
| Subject testing of 48 children using assistive mobility devices | | |
| and 20 children with pes planovalgus | Planovalgus Foot Deformity | 11/20 |
| Administration and assessment of outcomes tools | | 11/20 |
| Musculoskeletal model development, testing, and integration | | |
| Mechanical testing of cadaveric specimens | | |
| Quantitative data review, ongoing power analysis, and statistical | | 11/20 |
| analysis | | |
| Research dissemination | | Abs./Sh. Paper |













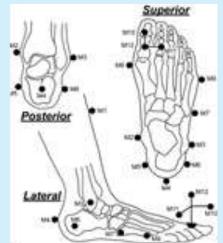
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Test 20 Subjects from MCW Orthopaedics and Shriners, Chicago

- Pes Planovalgus Foot Deformity
- Inter-lab Reliability Study
- AOFAS, FFI-Revised, CHQ, and PODCI / Functional Outcomes
- Fluoroscopy / 2-D and 3-D over course of project
- SIMM and Musculoskeletal Modeling



















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- 3D motion analysis with Vicon / Whole body gait
- Lower extremity inverse dynamics model / MFM & self-centering hip
- Fourier Motion Model: $f(\omega) = \alpha_b + \sum \{\alpha_j \cos[2\pi j\omega / 100] + \beta_j \sin[2\pi j\omega / 100]\}$
- Talocrural and subtalar kinetics
- Biomechanics and function of arthroereisis
 (Sta-Peg)
- Baseline, 1 Year and 2 Year Post Impact: treatment options, implant designs and rehabilitation strategies

