Pediatric and Human Movement Research

Shawn Russell

Motion Analysis and Motor Performance Lab
Department of Orthopaedic Surgery
University of Virginia
• Scoliosis surgery

• Harms Study Group
  – Multi-Center
  – Develop database > 3000 patients
  – 8 year prospective study to evaluate
    • A/P to P & staged vs not
    • Quality of life
    • Operative vs Non-operative outcomes
    • Risk of post operative infection
    • Evaluate natural history prior to surgical intervention
  – Effect of diagnoses on treatment
    • Scheuermann’s Kyphosis
    • Cerebral Palsy Scoliosis
    • Marfan’s Syndrome
    • Congenital Scoliosis
Pediatrics Goals

• Create Spinal Deformity Center at UVA

• Develop new in house database
  – Prospective study to evaluate:
    • Early onset scoliosis
    • Congenital scoliosis
    • Effects on lung function
  – Employ EOS imaging (low dose 3D x-ray)
  – Dynamics MRI
Movement Analysis

- How do interventions effect human movement
  - Clinical
    - Pre post surgery
    - Efficacy of interventions
Movement Analysis

- How do interventions effect human movement
  - Basic Science
    - Why do we move the way we do
    - What is better?
    - Use models to answer questions
Take Research Out of Lab Setting

- Inertial Measurement Units, IMU
- Collect motion data out of lab
- Developed hyper precise calibration techniques
- Stride length within 2-3%
- Activity recognition
  Walking, running, stairs, incline
Where Next?

- How do interventions effect human movement
  - Improve fidelity of models
    - Clinically
  - Basic Science
    - Develop better predictive routines
  - Increase ability to collect high quality motion data out of the lab environment
Thank You